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An Acknowledgment

For his untiring co-operation in the preparation of this book and for his courtesy in supplying accurate data and treatment records, the publishers wish to acknowledge their profound indebtedness to W. B. Chapman, M. D., of Carthage, Missouri.

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Introduction

Owing to the recent advent into general use of electrical apparatus for the production of diathermic energy, it has not heretofore been possible to establish standard technics applicable to the treatment of the various conditions in which diathermy is indicated. Appreciating the need of such a standard, especially among medical men who are just entering the physiotherapeutic field, we have attempted in this publication insofar as possible to supply this much needed information.

Most of the physicians and surgeons using diathermy are pioneers in the field, and employ whatever technic they, through experience, have found gives the best results. Up to the present time, these men have not organized and adopted procedures that may be regarded as standard. However, we find that the successful men, even where widely separated, have come to use practically the same general technic in their work, and in the preparation of this book of therapy, we have been careful to incorporate only that which has been adopted by a sufficient number of reliable electro-therapists to make it safe, reliable, and efficient.

While diathermy as an electrical modality is as nearly a positive as influence of altitude, latitude, and fluctuations of line current will permit, still the reactions of the human body differ widely in different individuals. Furthermore, the same individual does not react the same at all times, and in the use of diathermic energy as in the administration of medicines, the physician must use both caution and judgment, study each case individually, and adjust his technic to suit conditions.

Neurotic patients often have an extreme fear of any electrical modality, which they associate with electrical shock and high tension burns about which almost everyone is informed. In treating such patients, the operator must use extreme care to inspire their confidence by his attitude and make them understand that he is not carrying out an experiment, but that he knows exactly what he is doing and is confident of the results to be obtained. He should also check his connections, the application of the electrodes, the setting of the machine and all possible sources of error before starting the treatment. This further helps to inspire confidence and prevents accidents and errors in technic that, while they might not be dangerous, would destroy such confidence and produce unsatisfactory therapeutic effects.

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While diathermy is perhaps as safe as any agent used in the practice of medicine and surgery, it is possible to abuse it and produce burns, or uncomfortable sensations to the patient. We have endeavored, in this book, by furnishing reliable information regarding the application of this modality, to limit such unfortunate results as much as possible; but we cannot be responsible for occurrences of this nature, although we feel confident that if the operator will observe faithfully the instructions contained in this book of therapy, unsatisfactory results will be reduced to a minimum or prevented entirely.

It is our hope that by the publication of this Book of Therapy we have helped to advance physical and medical science, and to make the way smoother for the beginner in physiotherapy.

Educational Department,
H. G. FISCHER & CO., Inc.

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Medical Diathermy

Diathermy, the latest development and unquestionably the most useful of physiotherapeutic aids, is used in two distinct forms, medical or constructive diathermy, and surgical or destructive diathermy. The dividing-line being where stimulation ceases and disintegration begins. Both currents are generated in the same manner, but the methods of application and amounts of energy used differ widely, so both types will be described in detail.

Diathermy is practicable in all instances in which heat produced within the tissues of the human body is desirable as a therapeutic factor.

The ability to generate the heat *within* the tissues is the paramount advantage of Diathermy over any other method. Heat applied to the surface of the body by means of a hot water bag or an electric pad penetrates to a very limited depth only, and cannot be regulated.

With the help of Diathermy we are in a position to administer heat wherever it is desirable, and to any area superficially or to any required depth. The degree of heat produced may be gauged and regulated within any limits desired.

To distinguish between medical and surgical Diathermy, the former term applies to any heating within physiological limits while the latter is applied to destructive heating, for desiccating structures, as tumors.

In medical diathermy we have the treatment par excellence for painful or inflammatory conditions, i. e., it relieves pain, combats infection, hastens absorption and promotes repair.

By the employment of properly sized and shaped electrodes and the proper technic, we are able to deliver to areas of any size, not only greatly varying degrees of heat, but accurately measured dosage. This heating may be generally concentrated or localized to small sections by simply varying the technic of application. The result is accomplished with no sense of shocking or so-called electrical sensations on the part of the patient; in fact, the patient should never feel any other sensation than that of the required warmth.

Diathermy applications are bipolar, and while on first observance the general technic seems exceedingly complicated, it is in reality very simple. Proper attention must be paid to the seemingly small details of an average Diathermy application in the order of the following, as suggested by Dr. C. M. Sampson, in his "Physiotherapy Technic":

The first requisite to the successful use of diathermy is, of course, a properly constructed, resonant high frequency outfit. Given such an outfit, the other requisites are somewhat as follows:

1. *Selection of Method* of applying the diathermy, whether direct, indirect or modified, and if direct, choice of the double cuff, double plate or cuff and water method.

2. *Technic*—sedative or stimulative.

3. *Selection of Proper Electrode Material.* (Same for both technics.)

4. *Proper Preparation of Skin and Electrodes.* (Same for both technics.)

5. *Proper Application of Electrodes.* (Same for both technics.)

6. *Use of Elastic Bandages.* (Same for both technics.)

7. *Beginning of Treatment.* (Differs in the two technics.)

8. *Timing of Treatment.* (Differs in the two technics.)

9. *Proper Use of Spark Gap and Condenser.* (Differs in the two technics.)

10. *Terminating Treatment Properly.* (Differs in the two technics.)

Fischer Hospital Portable Diathermy Unit, Type "G"

11. *Calculating Dosage.* (Differs in the two technics.)

12. *Knowledge of Basic Laws That Apply.*

13. *Knowledge of Effects Produced in Tissues by Each Technic.*

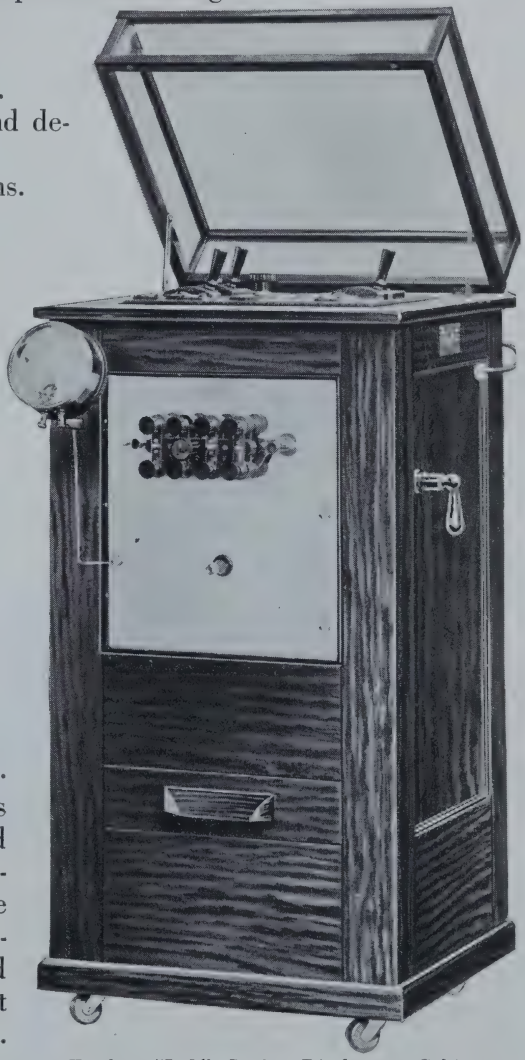
14. *Knowledge of Indications and Contra-indications for Each Technic.*

Diathermy dosage will naturally vary from as low as 100 M. A. up to as high as 2500 M. A. and over, to correspond with the type of case under treat-

ment as well as the square inch surface area of the electrodes. There is an accepted rule that 500 M. A. for each 7 square inches of surface covered should not be exceeded.

Briefly, medical diathermy produces internal heating (or what we might term an internal poultice), offers relief of venous and visceral congestion, creates capillary hyperemia, has marked analgesic properties, stimulates cells, glands and the vasomotor nerves, and is used to exceptional advantage in:

Pneumonic infiltrations.
Industrial injury cases.
Post-operative adhesions.
Absorption of callous and deposits.
Chronic kidney conditions.
Congestion of liver.
Old skin fibrosis.
Neuritis.
Immobilization.
Lumbago.
Neuralgias.
Sciatica.
Endocervicitis.
Epididymitis.
Arthritis.
Chronic urethritis.
Gonococcal infection.
Traumatic injuries.
Pelvic inflammation.
Angina pectoris.
Muscular atrophy.
Bronchial congestion.
And for the relief of pain.



Fischer "L-O" Senior Diathermy Cabinet

Diathermy applications are both sedative and stimulative, the difference being not in the amount of current employed but in the method of sending the current through the tissues. Dr. Sampson says:

"The choice of technic is decided by the results desired. If a

high degree of heat is desired, an intense hyperemia, an absorption of effusion or a softening of exudate or fibrosis, to relax muscular spasm, to sedate the pain of a neuralgia or neuritis or to help sterilize some chronic suppurative process such as osteomyelitis or empyema (always after drainage has been established) then the sedative technic should be used. If, on the other hand, it is desired to stimulate repair in a sterile area or to irritate and stir up an intense inflammatory reaction in some locality—a classical example would be nonunion in fracture—then the stimulative technic should be used."

Starting the treatment with a very low milliamperage, that is, with the spark interrupter points adjusted almost but not quite closed, and increasing the current gradually to the desired maximum, holding the current volume to that point for the duration of the treatment and then gradually reducing again to zero before throwing off the current will produce a thorough and most even heating in the tissues. This is sedative diathermy.

Fischer Type "G P" Portable Diathermy Unit

On the other hand, a treatment that is started with a considerable volume of current will stimulate the surface tissues and not have the penetrating sedative qualities of the first mentioned method. This latter type is referred to as stimulative diathermy.

Medical diathermy produces conversive heat. Where it is desired to warm any certain section of the body, to create an internal poultice, the proper method is to place electrodes opposite one another, which electrodes should be of such size as indicated by the area involved and of equal size if a general heating through is desired, or of carefully computed dimensions if the heating is to be localized nearer to one surface than the other.

When electrodes of equal size are applied to opposite sides of a limb or trunk, the heating effect will be apparent straight through with the maximum temperature increase at the point of crossing of the lines of energy from the edges of the plates—one to the other (note illustrations).

By using a large electrode on one side and a small electrode on the opposite side, the intensity of the resultant heat will be in exact inverse ratio of the square inch area covered. It is easily possible to concentrate so much heating under a very small electrode as to produce actual coagulation. We will discuss this under the heading of "Surgical Diathermy or Electro-coagulation," but this is just a warning not to attempt to employ a high milliamperage of current with a very small medical diathermy electrode in combination with a large electrode on the opposite side. Note the relative size of these squares:

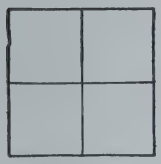


Fig. A

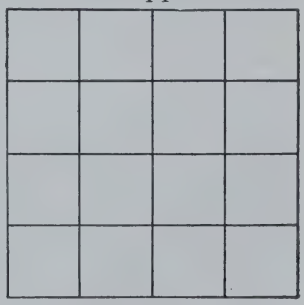


Fig. B

If electrodes of such proportions were placed on opposite sides of a limb, the heating effect under the four squares (Fig. A) would be four times as great as under the sixteen squares (Fig. B) because of the concentration of energy. Before applying diathermy to the human body some knowledge of its actions on the tissues is quite necessary. One may apply the same size electrodes to opposite sides of the limb and obtain markedly different results, i. e., by starting at a low point and increasing the current gradually (sedative technic) or by using too great a volume of energy right from the beginning (stimulative technic).

Figure No. 1 illustrates effect of heating when applying electrodes of equal size to opposite sides of a piece of beef.

Volume of current used 700 milliamperes

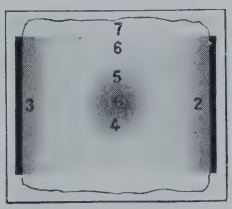


Fig. 1

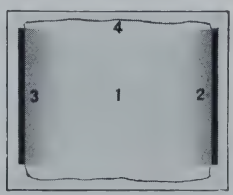


Fig. 2

for first 5 minutes, followed with 1000 milliamperes for 3 minutes.

Point I in aproximate line of crossing of lines of energy from opposite edges of electrodes showed highest thermometer reading —105.5° F.

Point 2 with thermometer placed in meat ½ inch from electrode—102.5° F.

Point 3 with thermometer placed in meat 1 inch from electrode —101.5° F.

Point 4 about 1 inch from No. 1—101° F.

Point 5 about 2 inches from No. 1—100° F.

Point 6, thermometer set just within path of crossing current—99.5° F.

Point 7—no heating. Temperature remains normal outside of path of current.

Figure No. 2 illustrates effect of heating when applying electrodes of equal size, as in No. 1, but instead of using a small amount of current and increasing gradually, a great volume of current was used right at the start. The only heating effect is immediately under the electrodes at points 2 and 3. Points 1 and 4 remain normal. This application becomes unbearable to the patient before any good can result, on account of the drying out of the surface with resultant increased resistance and burning sensation at points of contact.

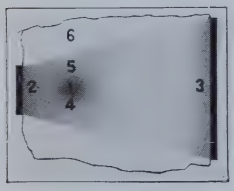


Fig. 3

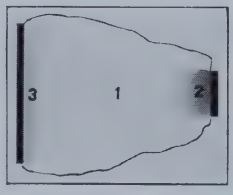


Fig. 4

Figure No. 3 illustrates effect of heating when applying electrodes of unequal size, in this instance, a 5 inch circular disc on one side of a piece of beef, and a 2-inch on the other.

A moderate current, only, was used at the start—500 milliamperes for 5 minutes, increasing to 750 milliamperes for an additional 5 minutes.

Point 1, the point of crossing of lines of energy of opposite edges of the discs, showed a thermometer reading of 105° F.

Point 2, with thermometer ¾ inch from smaller disc—103° F.

Point 3, with thermometer ¾ inch from larger disc—99.5° F.

Point 4, with therommeter ¾ inch from No. 1 showed a reading of 102° F.

Point 5, with thermometer 1½ inches from No. 1, showed a reading of 101° F.

Point 6, this section remained normal.

Figure No. 4 illustrates effect of heating when applying electrodes of unequal size, as in No. 3, when using 900 milliamperes right from the start.

Practically all of the heat concentrated at point 2, under the smaller disc, the thermometer registering 110° F. at the end of 10 minutes.

Heating at point 1 was negligible because of the resistance of the skin at points 2 and 3, due to the too sudden application of current and resultant burning.

The current was then increased to 1500 milliamperes for 7 minutes and then 2000 M. A. for 5 minutes additional. The meat was thoroughly cooked at points 1 and 2, especially so under the smaller disc, and blanched considerably at point 3, but the temperature did not exceed 110° F. at a distance of 2 inches from point 1.

Figure No. 5 illustrates the application of one 5-inch disc and one of 1-inch, only, to opposite sides of a piece of beef. Only moderate current was used, starting at 300 milliamperes and increasing gradually to 600.

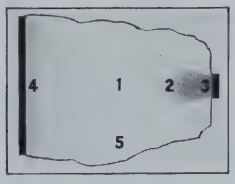


Fig. 5

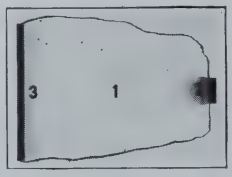


Fig. 6

Points 1 and 2 showed increase to 100° F. only.

Point 3 showed a reading of 106° F.

Point 4 showed temperature increased to 102° F.

Point 5 showed no perceptible increase from normal.

Figure No. 6 illustrates the application of unequal sized electrodes as under No. 5, but with 700 milliamperes used to start.

Heating was increased to 108° F. at point 2, to 100° F. at point 3, and remained normal at point 1 because of the resistance of the skin at point 2, due to the too sudden application of current and resultant burning under this smaller disc.

It is to be understood that if these tests were being made upon living flesh with the blood stream coursing, that point 7, in figure No. 1, and point 4, in figure No. 2, point 6, in No. 4, and point 5, in No. 5, would not have remained at normal temperature, but there would have been some rise in temperature because of heat conduction at these points.

Starting the treatment with a small amount of current and grad-

ually increasing the volume will warm tissues almost equally throughout between equal sized electrodes, with the point of crossing of the lines of force, as mentioned in the foregoing, somewhat higher in temperature.

On the other hand, starting the treatment with a great volume of current abruptly, practically all of the heating will concentrate near the surface right under the electrodes, with a resultant drying out of the conducting materials that you have applied (soap lather, etc.,) as well as the skin itself. Your patient will be uncomfortable and will complain of pricking sensations. This latter condition is to be avoided in all cases.

This theory also holds true up to a certain point when using electrodes of unequal size. Starting treatment with a moderate current and gradually increasing the volume will produce a result about as indicated in figure No. 3.

Increasing the volume of current too rapidly will cause heating under the surface of the smaller electrode as in view No. 4, and in just a minute's time the sensation will have become unbearable to the patient.

The volume of current as measured in milliamperes will determine the length of the cone-shaped heated area, although the point of crossing of the lines of current from the outer edges of each electrode will always be the point of maximum heating, except when the electrode on one side is a great deal smaller than the other, when the heating will concentrate very noticeably at the surface immediately under the smaller contact.

Diathermy currents take the shortest course between two points of contact in the body, whereas continuous currents (as for example, Galvanic,) always follow the path of least resistance.

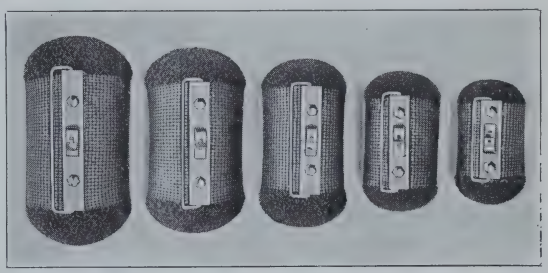
Diathermy currents find great opposition or resistance when passing through metals, which materials form the best conductors for continuous currents. Bone offers greatest resistance to the passage of diathermy; tissue and moist skin offer very little resistance. Muscle and bone retain the heating from the diathermy treatment for hours, while most of the skin heating is dissipated by radiation; and the tissues immediately beneath the skin lose most of the heat through conduction by the dilated blood vessels.

To recapitulate: The resistance of the skin and the thickness of the fat underneath the skin, or, in fact, anywhere between the electrodes; the moisture of the tissues; density of the tissues; reflexes of the patient; distance between electrodes; size of electrodes; voltage and milliamperage employed, as well as the de-

gree of temperature desired all enter into consideration when giving a diathermy treatment.

We repeat another important point. The heating effect under an electrode 2 inches square will be four times as great as under an electrode 4 inches square, that is, with the same setting of the machine. By doubling the milliampere reading, say for example, from 500 to 1000 M. A., we actually increase the heating effect by four times.

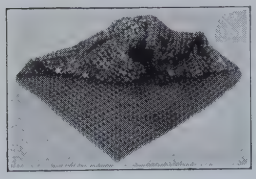
A Diathermy electrode, as well as electrodes for the administering of any other electrical modality to the human body, should be of bare metal. This metal may have a backing or support of a flexible material, as for instance, a soft rubber sponge, but the point we wish to emphasize is that the element in direct contact with the skin should be metal and not some absorbent material. Absorbent padding soaked in brine or other conducting medium, may be employed, but there is always danger of such electrodes drying out during the treatment and losing their conducting value. There is even greater danger of blistering by steam, and it has been found that a water-soaked electrode of say, 3 x 6 inches, which has 18 square inches of surface area, would be active only for probably 6 square inches at the end of a 10-minute treatment, the fluid having all gone to one end instead of being evenly distributed.



Mesh Electrodes with Sponge Rubber Pads

We recommend two types of metal electrodes—German silver, flat link mesh for all uneven surfaces, over the shoulder, joints, etc., and sheet block tin for flat surfaces. Such metal electrodes, as well as the surface of the skin at the point of contact, may be well covered with a thick soap lather, something on the order of a good shaving soap (we hear quite often that ordinary Ivory soap makes an excellent medium). Before applying the metal diathermy electrodes to the skin, cover both thoroughly with the soap lather, and as quickly as possible bind the electrode in place.

On the limbs, the electrodes are generally held from slipping with elastic bandage, wound around just tight enough to hold the electrode but not so tight that the natural swelling of the limb as a result of the heating will produce any constriction (as for example, an ischemia).



Flexible Mesh Electrode

Sandbags are invaluable for holding electrodes in place on the trunk, and very often on the limbs, and several sizes and shapes of sandbags should always be available in the diathermy room.

Never fail to determine the size and shapes of your electrodes, carefully. The indifferent electrode, that is on the opposite part of the body from which the greatest heating effect is desired, should always be of liberal size. There is no advantage in making your indifferent electrodes too small.

Never permit poor contacts or loose connections. Fully 90 per cent of all complaints as a result of diathermy treatments are the direct result of either improperly applied electrodes, or poor connections. A contact that is not positive will cause a prickling, burning sensation in every instance. This lack of proper contact may be at the point where the cord connects to the machine, where it connects to the electrode, or even between the electrode and the skin itself.

In giving diathermic treatments, the operator must use extreme care to keep the skin surface between the electrodes absolutely dry. Soap lather, damp elastic bandages, or even perspiration will often "short-circuit" the current to a sufficient degree to produce unequal heating effects inside the tissues. It is often advisable not to use soap lather to make the contact with the skin, and in this case, immerse the electrodes in hot water, dry quickly before they are too cool and apply directly to the skin. The warm electrodes stimulate the sweat-glands, the skin becomes moist underneath the electrodes and about the same degree of heat can be obtained as if the soap lather had been used. The only requirement is that the electrode be in contact with the skin at all points, as a space underneath any part of the electrode will produce sparking and discomfort to the patient.

Current volumes, duration of treatments and frequency of treatments will depend, naturally, on the type of treatment and the nature of the case. We will endeavor on the following pages to offer considerable assistance along this line.

Surgical Diathermy

Surgical diathermy is the term given to the application of high frequency currents for the destruction of tissues by the heat produced through resistance offered by the tissues through which the current is passed.

This method differs from all other applications of heat to the body, in that instead of the heat being sent inward from the outer surface as is the case when employing a cautery knife or hot iron (electrically or otherwise) the heat is generated within the tissues. The temperature at the point of contact of the active electrode is raised to the point of coagulation.

Electro-coagulation is used to advantage in malignancies, in fact, it is far superior to any other known method in that what would be otherwise inoperable growths are successfully destroyed; the blood and lymph coagulate, and vessels are sealed and infecting organisms destroyed.

Tissues or growths to be destroyed by electro-coagulation must be accessible; that is, the active electrode must be placed in actual contact.

The major advantages of surgical diathermy, or, as we shall term it hereafter in this publication, "electro-coagulation," follow:

Tissues are coagulated to any desired depth.

Operations are bloodless and leave sterilized wounds.

The blood and lymph channels are sealed, lessening the danger of metastasis in cases of malignancy.

Tumors otherwise inoperable may be safely removed.

Normal cells are left intact, operations are quickly done and post-operative adhesions are rare; and convalescence is rapid.

Electro-coagulation is used to advantage in:

Destroying growths and infective granulomata of the skin and mucous membrane of the mouth, nose, pharynx, tongue, larynx and oesophagus.

Cancerous conditions—sarcoma, and carcinoma.

Destruction of diseased tissues and benign new growths.

Tumors of the uterus and bladder.

Vascular tumors.

Chronic and malignant ulcerations.

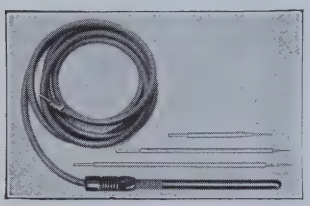
Superficial lesions.

Electro-coagulation as a method is similar to medical diathermy only in the fact that it is bipolar, that the same currents from the high frequency machine are employed, and that heat alone is the agent.

In administering medical diathermy we employ heat within physiological limits, while with electro-coagulation, destructive measures—actual coagulation—are resorted to. We will refer in the following copy to *active* and *indifferent* electrodes.

The active electrode is the small point or disc which is placed in direct contact with the diseased tissue, or the tissue to be removed; while the indifferent electrode is usually a large metallic plate to cover a good deal of skin surface (large enough so that there will be no danger of destroying healthy tissue), which is placed somewhere adjacent to the point of operation.

For the removal of some growths, a piece of metal tubing is held in the patient's hands as the indifferent electrode, but this method meets with little approval. The skin under the indifferent electrode will become only slightly warm because of the large surface covered, as compared to the extreme destructive heat at the point of contact of the active electrode which is so very much smaller in area.



Needle Point Electrodes and Holder.

The active electrode may be a little point, either single or multiple, or almost any size of small disc, usually fastened to an insulated handle for convenience in operating.

Set of Surgical Diathermy Electrodes in *Special Case*

The indifferent electrode may be of either German silver flat link mesh material, or sheet block tin, and should be liberal in size, preferably 8 inches square (or round), or larger. This indifferent electrode is to be coated with thick soap lather, and the surface of the skin where it is to be placed is also coated with this material, insuring the best of contact with a minimum of electrical resistance. If plain or salt

water is employed as a softening or conducting medium, scalding may result.

When employing electrocoagulation the nature of the case in hand and the character of the parts involved will aid in determining whether the direct contact method as described in the foregoing, or keeping the active electrode at a distance from the growth and sparking, is desired. For very small superficial growths either type of application may be used with equal effectiveness.

The indifferent electrode must be bound or held in the desired position in such manner that it cannot move during operation. The small active electrodes are rarely moved with the current on. When a knife type electrode is employed it may be moved slightly in the desired direction, but the tendency on the part of most operators is to proceed too rapidly, and insufficient coagulation at some place will result. Never attempt to hurry electro-coagulation. Proceed slowly and methodically and be assured of finished results, paying more attention to the blanching of the tissues than to the reading on the milliampere meter.

Effects of Electro-Coagulation

Illustration No. 1.

A piece of lean beef, 2 inches square and 3 inches thick, was placed on a flat metal sheet as the indifferent electrode. The ¾ inch circular disc (catalog No. 1323) was placed in firm contact with the center of the top and a current of 700 milliamperes was passed for 1 minute, followed with 1200 M. A. for another minute. Result:—An evenly coagulated mass of tissue, white in appearance, extending 1 inch on the surface and ½ inch deep. No evidence of burning or charring.

Fig. 1

Fig. 2

Fig. 3

Illustration No. 2.

The 3/4 inch disc was placed in contact, as above, with another piece of beef, and approximately 4000 milliamperes passed for one full minute. Result:—A charred crust 1 1/8 inches wide on the surface, and extending down almost 1/4 inch. Below this hardened section was a coagulated mass down another inch, tapering off in a cone shape.

Illustration No. 3.

A larger piece of beef measuring 3x3x2 1/2 inches was used in this experiment. The 5-pronged multiple needle electrode was forced down into the center until the flat section rested on the meat proper, and 1100 milliamperes passed for 1/2 minute, followed with 1/2 minute of 2000 M. A. Result:— An evenly coagulated white appearing mass of tissue, extending 1 3/8 inches deep and 1 1/8 inches wide. No charring.

Illustration No. 4.

Fig. 4

A piece of fresh lean beef 2 3/4 inches square by 2 inches deep was placed on the indifferent electrode, and the single needle No. 1308 plunged 1 inch down from the top. A heavy current of 2300 milliamperes was passed for 1 minute. Result:—A burned mass, charred black where the electrode had made contact, and thoroughly cooked clear thru to the bottom and 7/8 inch wide.

Illustration No. 5

The same size piece of beef was used as described under figure 4, and the same electrodes. Current was turned on more gradually—starting at 600 milliamperes for ½ minute, followed with 900 M. A. for the same length of time. Result: An even coagulation, ⅝ inch wide and 1 inch deep. No charring, and the line of coagulated tissue clearly defined.

Fig. 5

ELECTRO-COAGULATION CAUTIONS

As far as practicable, avoid the larger veins and arteries when using electro-coagulation.

Be cautious when operating around bony structures as there is always a risk of destroying the periosteum.

Start every operation with the thought that too much speed may be the cause of possible failure when the operation might have been successful if more time and care had been taken.

Monopolar Desiccation

The term "fulguration" was formerly applied to what we shall refer to as monopolar desiccation. This is a dehydrating process usually employed in the removal of bladder papilloma, lupus vulgaris, warts, moles, etc.,—superficial lesions. No indifferent electrode is used; application is made from the higher voltage high frequency current instead of bipolar diathermy outlets.

These applications may or may not be painful depending on the depth and area of the lesion under treatment, but it is generally advisable to employ a local anesthetic. Many operators find an indirect application better than this direct monopolar treatment.

Best results are obtained by placing a metallic electrode either on the chest or over the cervical spine, when working on the head, or somewhere near the site of operations when working elsewhere on the body, which pad is connected to the high voltage high frequency terminals, and pointed electrode is held in operator's hands.

The patient may even hold a metal autocondensation handle firmly in both hands to make connection to the proper outlet on the machine, but the resistance of the wrists and arms must be taken into consideration and more current employed than where the plate electrode was placed closer to the point of contact of the active electrode as first described.

The needle or pointed electrode is held firmly in the operator's fingers and may either be placed in contact with the spot to be removed before the current is turned on, or the current turned on first and the needle then applied.

When employing this indirect method current goes from the patient to the needle in the operator's hands. The application is less painful than the direct method; the operator will feel no sensation of currents, no ill effects will result, but the penetration will be less deep than when employing the direct method.

Another indirect method, bipolar instead of monopolar, is obtained by connecting the auto-condensation pad or cushion to one of the D'Arsonval or diathermy outlets, and the active electrode to the opposite diathermy pole. The patient may either sit or recline on the pad or cushion, and the active electrode is held in an insulated holder in the operator's hands. Application to the growth or lesion is made exactly as described under the indirect method, but sparks will be shorter and much hotter and more caustic. This method may be used for actual coagulation procedure.

Auto-Condensation

The D'Arsonval auto-condensation treatment is
Sedative,
Reduces high blood pressure,
Increases metabolism and body heat, and is most useful in:
Neurasthenia,
Arterio-sclerosis,
Dysmenorrhea,
Leukemia,
Menopause, and
Insomnia.
The bipolar current is employed.

The necessary appliances for administering this treatment consist of a folding chair pad or padded cushion, on which the patient either sits or reclines, and a metallic handle which is usually held in the patient's hands. The patient undergoing treatment really forms one section of a condenser.

The auto pad, as we will call it in the following, consists of a metallic plate covered with sufficient insulation to prevent the high voltage current jumping thru, and this plate forms the opposite side of the condenser.

When administering an auto-condensation treatment it is well to remember, as in the giving of any electrical treatment, to employ only a moderate amount of current at the start regardless of the amount of milliamperage that may follow, and then to taper off each treatment by cutting the current down gradually before opening the switch.

The volume of milliamperage will depend on the nature of the case, although 600 to 850 M. A. are about average. Most operators agree that the milliamperage used for the first treatment should not exceed 300, that this current be increased at subsequent sittings to the desired maximum, and to taper off gradually to the end of the series of treatments. As an example: it has been proven that by breaking the series of treatments off too abruptly the effect will be lost in a short time, that the patient's blood pressure may have been reduced for the time being but

Auto-Condensation Handle

that it soon returns almost to normal. On the other hand, tapering the milliamperage off gradually, the effect is lasting and usually completely satisfactory.

Do not touch your patient during a treatment, as the shock at the point of contact might be disagreeable.

Be sure that you use a wooden chair or wooden table. Never lay the auto pad out against metal.

You will find from experience that you will be able to pass a great deal more D'Arsonval current thru a stout patient than thru a thin one. This is just the opposite of the effect obtained in administering medical diathermy, as an obese person will take less milliamperage at a given setting of the controls on the outfit, than a thin one.

You should always recommend that your patient drink a great deal of water during a series of auto-condensation treatments.

One of the most important features of an auto-condensation treatment is that your patient must be fully relaxed and made just as comfortable as possible.

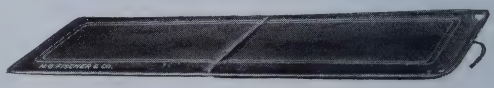
Patients with exceedingly high blood pressure, and with a slow pulse, should be carefully watched during and after treatments.

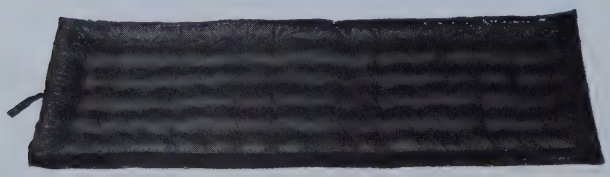
The treatment of hardened arteries, walls lined with calcareous deposits, must be undertaken in a systematic way if lasting results are to be obtained.

During the menses it is inadvisable to use any high frequency treatments, but on the contrary, in cases of suppression, auto-condensation may be used as a stimulant.

It is well to place the patient's hands on a pillow or large book when using a metal handle, in this way keeping the hands away from the body proper so there will be no danger of sparking. Caution your patient not to drop this metal handle with the current on, or even relax the hold, as resulting sparks will be sufficient to cause a severe burn.

At Right: Auto-Condensation Couch Pad.





At Left: Auto-Condensation Couch Cushion.

High Frequency

High frequency vacuum and non-vacuum electrode applications are not as widely used as in the past because the effect is only superficial as compared to the far deeper auto-condensation and diathermy treatments. However, high frequency electrode applications are quite clearly indicated in infectious skin diseases, as well as infections in the orifices which can be reached with the electrodes.

High frequency currents:
Dilate the blood vessels,
Increase the blood supply to a given area.
Increase oxidization and oxygenation,
Promote absorption of exudates, and
Liberate ozone.

These applications are used in the treatment of:
Skin ulcers,
Blepharitis,
Eye strain,
Lumbago,
Uterine diseases, and
Enlarged tonsils.

When the glass vacuum electrode is properly connected to the high frequency terminal on your machine, that is, with the aid of the proper handle and conducting cord, and the switch closed, it does not always illuminate with the familiar violet colored glow.

If current does not immediately pass thru the electrode, grip the glass with the bare hand to warm it, or increase a bit the volume of current passing.

When an electrode becomes what we might term "stubborn" and will not produce the proper effect; shut off the machine, leave the controls as they were but remove the heavy cord from the active pole and remove the electrode from the high frequency handle. Hold the electrode firmly in the bare hand. Start the machine and then touch the glass electrode itself to the active post, and unless the tube is punctured or otherwise defective, it will glow properly. Then shut off the current, connect the cord, handle and electrode to the machine as before and you should have no further trouble.

* * * * *

Metallic electrodes directly connected to the diathermy current are far more effective and will produce more profound results than the glass vacuum tubes.

DIATHERMY THERAPY

An Alphabetical List of Indications and Treatments

Adenoma

An adenoma is a frankly benign growth, but with a tendency to malignant degeneration. Therefore its removal by surgical diathermy is indicated regardless of cosmetic results. The technic is the same as for the electro-surgical removal of all other new-growths. (See pp. 42 to 45.) If there is a suspicion of malignancy, the operation should be supplemented by x-ray or radium therapy.

Adhesions

While internal adhesions may not be removed by diathermy, the application of heat by medical diathermy will relieve the pain often caused by these adhesions, especially if there is a certain degree of muscular spasm present as in adhesions of the bowels. The application should be mild. If treating for adhesions inside the abdominal cavity, also the thorax, from 1000 to 1200 milliamperes of current is sufficient.

Application of Electrodes in Adhesions

Adhesions—Massage

Treatment

Diagnosis—Adhesions.

Modality — Medical Diathermy.

Method—Active electrode over adhesion, indifferent on opposite side of body.

Duration—Twenty to thirty minutes.

Milliamperes—600 to 2000 according to patient's condition and tolerance.

After treatment—Massage gently.

Indications—All adhesions.

Contra-indications — Weak heart, presence of pus.

Albuminuria

Albuminuria is a general term, and before applying diathermy, the physician should ascertain the cause of the albuminuria, i. e., whether it is cardiac, cyclic, digestive, functional, neurotic, lordotic, renal, or otherwise. The indications are for relief of pain and where the general effects produced by heat are indicated. Apply electrodes as described under "Diathermy To The Back", p. 41. Note:—The physician should use great care in applying excessive heat to an infected kidney.

Alopecia

In cases of baldness where the hair roots remain but are inactive, physiotherapy holds out to the patient the possibility of a new crop of hair. Short, thin sparks of static electricity from the glass high frequency electrode all over the scalp are followed by first degree erythema treatment with actinic light. Time of static treatment, 10 minutes. After a number of treatments, scalp will become thoroughly pigmented; treatment should then be discontinued for three to four weeks, and then resumed. Where hair root atrophy has long existed, treatment is useless. In syphilitic alopecia, specific treatment for syphilis is essential before alopecia can be benefited.

Amenorrhea

See Diathermy in Gynecology, pp. 68 to 71.

Diathermy or internal heat to the female pelvis is indicated in this condition. If possible, use Chapman vaginal electrode following technic described in article above, but do not use excessive milliamperage. About 1500 milliamperes is sufficient. The treatments should be given about three times per week, and supplemented by general irradiations from the air-cooled ultraviolet lamp, and by a tonic containing iron. Calcium and phosphorus are also useful in the treatment of this condition. If intra-vaginal treatments are contra-indicated, account young girl, unruptured hymen, etc., a mesh or block-tin electrode may be applied anteriorly above the pubis and posteriorly over the sacrum with satisfactory results.

Analgesia

Diathermy should not be used in any condition marked by an impairment of the sensory nerves. On account of the inability of the patient to experience pain, diathermy in conditions marked by analgesia is contra-indicated, as a severe burn might result.

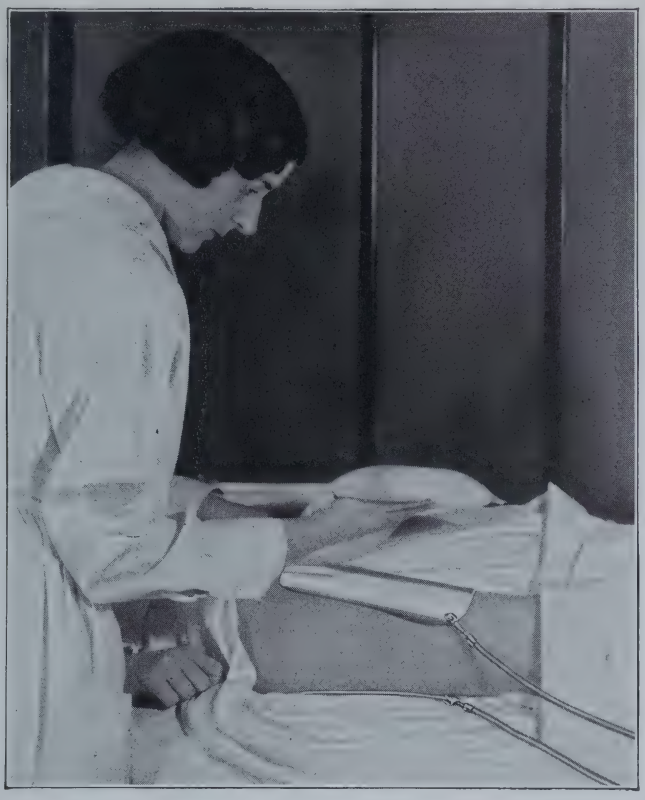
Anemia

In anemia, the blood is deficient in some or all of its important elements. Simple anemia may be caused by hemorrhages, by improper nutrition and faulty assimilation, or by some abnormal drain on the blood, as in pernicious anemia, chlorosis and leucocythemia, we have conditions vastly more serious, with marked changes in the character of the blood. The first step in treatment is to discover and remove the cause, and to institute proper diet and elimination. Iron and arsenic are the preferred agents of medication, and diathermy, properly prescribed to meet the individual need, is of great benefit.

Below:—Application of the High Frequency Current to the Spine

Where symptoms indicate hypotension, high frequency applications to the spine, with the glass non-vacuum electrode as illustrated, will be of benefit. 20 to 30 minutes daily.

Application of the High Frequency Current to Spine



Application of Electrodes in Anemia

Application of Electrodes in Anemia

Large block tin electrodes to the thigh, anteriorly and posteriorly as illustrated, are used in diathermy treatment to increase red corpuscles and hemoglobin content of blood.

Treatment

Diagnosis—By blood examination.

Medication—Iron and arsenic.

Technic—Medical Diathermy.

Application—Large block tin electrodes to bones of thigh.

Milliamperes—800 to 1500.

Time—20 to 30 minutes daily.

Indications—Deficiency of red corpuscles and hemoglobin.

Aneurysm

Diathermy may be employed to relieve pain caused by an aneurysm, but has no effect on the course of the disease. The lowest voltage that will produce a smooth-flowing current across the spark-gap should be used, and the amperage raised cautiously. Some men claim that 100 milliamperes is sufficient while others use as high as 1200. The physician should not entrust this treatment to an assistant, but should keep in constant touch with the patient during treatment. Electrodes of approximately the same diameter as the depth of the tissues to be traversed should be used. Treat for from ten to twenty minutes.

Angina Pectoris

Intense strangulating pain, accompanied by dypsnea and great physical depression, characterize this malady. Careful diet and abstinence from all undue exertion are essential. When the paroxysms occur it is essential that the spasm and constriction be controlled. The medication generally favored is nitroglycerine in large doses. Diathermic heat directly to the affected region is excellent, and may be employed two or three times a week as a preventive, as well as in emergency. Use large block tin or mesh electrodes directly over the heart and on the back. Employ the minimum dosage that will give relief, 400 to 1000 M. A., for 10 to 12 minutes. Contraindications, Myocarditis, Hypertension.

Angioneurotic Edema

Medical diathermy has proved valuable in the treatment of this condition. The treatments should be given daily and the amperage elevated to the skin tolerance. Treat for from twenty to thirty minutes, using large block tin or mesh electrodes.

Arterio-Sclerosis

Characterized by a thickening and stiffening of the walls of the arteries. Especially in the early stages, diathermy, combined with the regular treatment, may be used to advantage. The patient is given autocondensation treatments of 20 to 30 minutes duration, daily, lying on the autocondensation pad and holding the autocondensation handle. The current is advanced very gradually to 300 milliamperes; do not exceed this until you are sure the patient will react favorably to more. Under favorable conditions as much as 700 milliamperes may be given. At end of treatment, current is shut off very slowly. Contraindications are hypotension, myocarditis, low systolic and high diastolic pressure.

Diathermy to Ankle

Above:—Treatment of ankle by diathermy, using two mesh sponge electrodes, one on either side of ankle, held in place by elastic bandage. 700 to 1000 milliamperes for 20 to 30 minutes.

At Right:—Foot resting on large block tin electrode, mesh cuff above ankle. 500 to 700 milliamperes for 20 to 30 minutes.

Diathermy to Ankle

At Left: Treating both ankles, with cuffs above ankles and toes immersed in basin not connected to machine. Current goes to one cuff, through toes and back to other cuff. 20 to 30 minutes.

Diathermy to Ankle

At Right: Another variation of the treatment described above — both feet immersed in basin. Current passes from one cuff through feet to other cuff. 20 to 30 minutes.

Diathermy to Ankle

Above: Cuff electrode above ankle, foot immersed in basin containing ½ in. of water in which other electrode is inserted. Elastic bandage being applied.

Indications: All painful or inflammatory conditions of foot and ankle.

At Right: Same treatment as above, with electrode higher on leg to throw heat higher in ankle. 500 to 700 milliamperes for 20 to 30 minutes.

Arthritis

Arthritis is essentially an inflammation of an entire joint. It may be acute or chronic, the acute stage lapsing naturally into the chronic when the local pain is treated without due attention to the basic causes.

Unquestionably the most important feature of the diagnosis and treatment of any case of arthritis is the discovery and the removal of these underlying causes. There is a source of toxic poison somewhere in the system of the patient suffering from arthritis. Find it, and you have taken the first step toward relief.

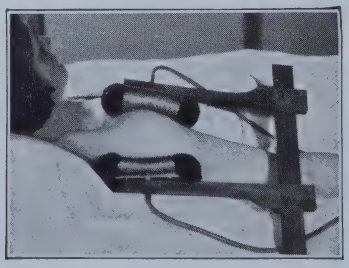
The colon is always to be suspected. Decayed teeth are often at the root of the trouble, as is sinus trouble, or indeed any source of toxins. The genital organs should always be thoroughly examined, and the patient examined for indications of specific disease. If this is present, treatment must be instituted to clear it up before the arthritis can be brought under control.

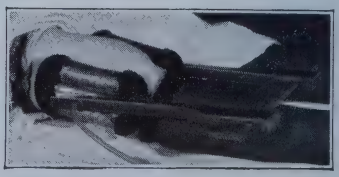
The acute stage frequently follows exposure to cold and dampness, and these conditions are sometimes erroneously accepted by the patient as the cause of the disease. As a matter of fact, they have merely served to bring the trouble to a focus.

After the cause is removed, diathermy treatment may be instituted in all cases, and is accepted by physiotherapists as the most satisfactory method of curing the acute disease and arresting it in the chronic stages.

With diathermy we can produce an active hyperemia in the diseased joint, hyperemia being one of nature's methods of overcoming a pathological condition, thus reducing congestion and having a tendency to absorb soft exudates.

Physiotherapy in arthritis in no longer an experiment, its therapeutic value has been proven beyond a question of a doubt. It now ranks with medicine and surgery as a therapeutic agent.





Above: Diathermy treatment of Arthritis

Arthritis of Shoulder

This is a condition frequently met with in medical practice, and one in which diathermy treatment is of exceptional value. Electrodes are applied as shown in the illustration, large tin plate or mesh electrodes on both chest and back near shoulder, and mesh cuff electrode on upper arm. Diathermy clamp with mesh sponge electrodes, shown on page 34, may be used if desired. Treatment given as described below.

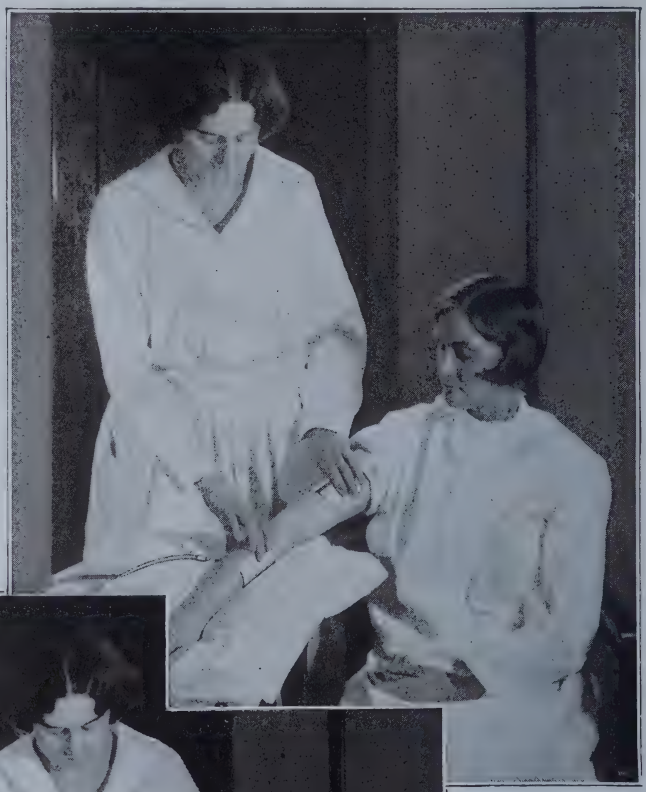
Treatment

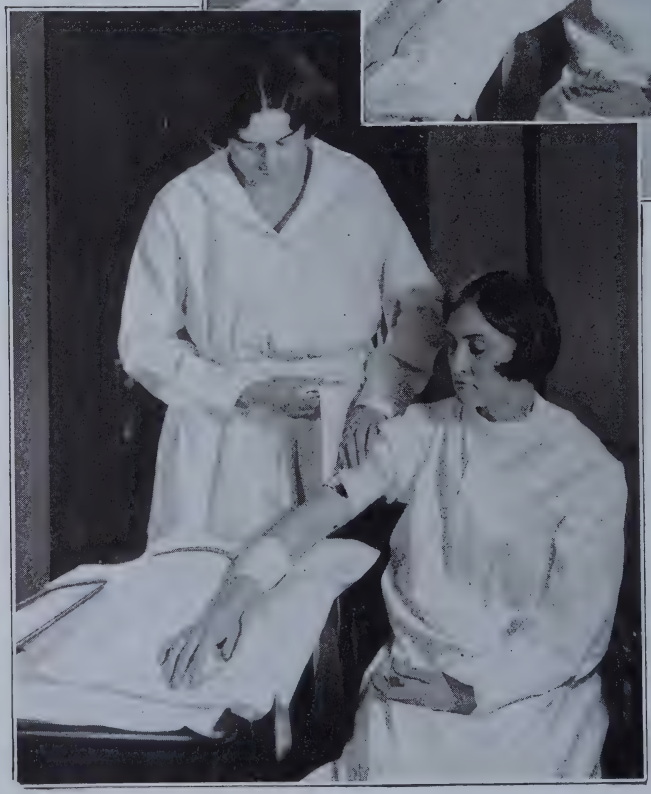
Diagnosis—Arthritis of shoulder.
Symptoms—Pain, tenderness.
Treatment—Medical Diathermy.
Milliamperes—1200 to 2000.
Method—Plate beneath shoulder, mesh over intra-clavicular space, both on one pole; mesh cuff on upper arm, on other pole.
Time—Thirty minutes.
Indications—All cases.
Contra-indications—None.

Arthritis of Elbow

At Right: Affixing cuff electrodes for treatment of affected elbow. Note position of these electrodes.

Below—Method of holding electrodes in place. The bandage should be sufficiently loose to avoid congestion — preferably elastic.





Treatment

Diagnosis—Arthritis.

Treatment—Diathermy.

Milliamperes—1200—2000.

Time—20 to 30 minutes.

Indications—All cases.

Contra-indications—None.

Arthritis of Knee Joint

At right—Application of sponge electrodes to knee joint. These are held in place by loose bandage, preferably elastic, or by diathermy clamp (see p. 34).

Below — Metal cuff electrodes above and below knee, for same treatment. Note position of these electrodes.

Treatment

Diagnosis—Arthritis.

Treatment—Diathermy.

Milliamperes—1200—2000.

Time—30 minutes.

Indications—All cases.

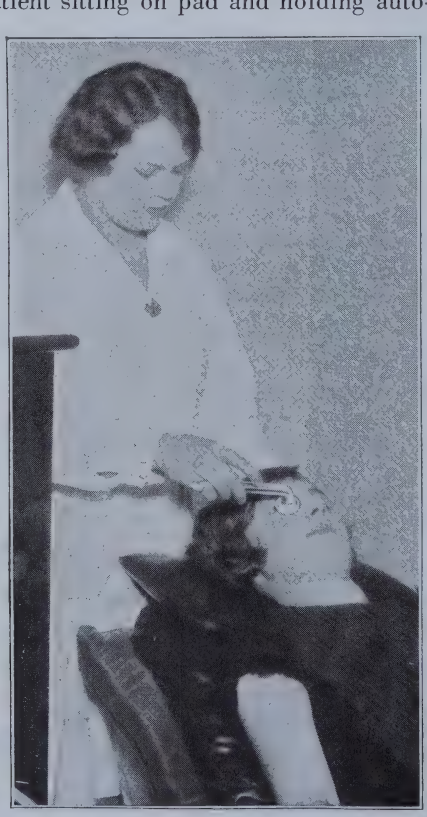
Contra-indications—None.

Auto-Condensation

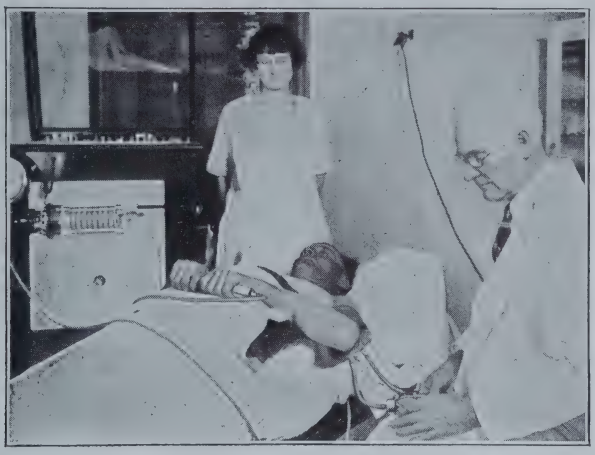
Above:—Auto-condensation treatment; patient lying on auto-condensation pad and grasping auto-condensation handle. A pad is placed between patient's body and the auto-condensation handle to avoid unpleasant prickling.

At Left (below):—Auto-condensation to the eye, using vacuum electrode. Patient lying on auto-condensation pad, which is connected to monopolar outlet on machine. Eye electrode is NOT connected, but is grounded through operator's body.

Below (at right):—Another standard auto-condensation treatment; patient sitting on pad and holding auto-condensation handle in hands.



Auto-Condensation—Continued



Above—Auto-condensation for high blood pressure. Pressure is being taken at intervals as treatment progresses. Bipolar current, 600 milliamperes for 20 minutes. Treat daily. In the presence of heart and kidney complications the auto-condensation treatments are often not borne well by the patient. Physician should keep in constant touch with his patient during the treatment, and not leave these cases to the care of an inexperienced technician. In hypertension the results obtained are determined by the skill and attention of the physician.

At Left—Pleasant auto-condensation treatment for the neck. Patient seated on pad, other pole of bipolar current passing through operator's fingers to neck.

At Right—Same treatment, for jaws and throat.

Adenitis

Treated by a modified form of diathermy, in which vacuum electrode is held in place over the swollen gland by the patient herself. An indifferent electrode of block tin or mesh, 2x4 inches in size, is held in place on the opposite side of the neck by a loose bandage. Owing to the difficulty of making good contact over the gland with ordinary electrodes, and because of the difficulty of maintaining contact, this form of treatment makes an otherwise difficult application quite simple. Bipolar current, 400 milliamperes for 15 minutes.

AUTHOR'S NOTE: For therapeutic effects this method is inferior to the usually employed direct application of mesh or block-tin electrodes to the surface to be treated.

Atony

Medical diathermy is indicated in the treatment of impoverished tissues, however, if there is an impairment of the sensory nerves, great care should be exercised to prevent burning. The main value of diathermy lies in its effect on the vascular system. Freshly oxygenated blood is drawn to the part and the metabolic exchange proceeds more rapidly. Treat for from thirty to sixty minutes daily, using just sufficient current to produce a pleasant sense of warmth within the tissues. Apply electrodes as in Arthritis, pp. 34 to 37.

Boils

See Benign Skin Blemishes, pp. 42 to 45, and Furunculosis, p. 64.

Bone Tuberculosis

See Tuberculous Osteomyelitis, pp. 108, 109.

Bronchitis, Acute

See Pneumonia, pp. 96 and 97—technic is same.

Bronchitis, Chronic

See Pneumonia, pp. 96 and 97—technic is same.

Buboes

Diathermy should be used in this condition where efforts to abort the progress of the adenitis has failed, and the physician desires to rapidly break down the gland producing pus. Diathermy acts as a poultice in this condition and "draws" the infected area in the same manner as hot external applications. After pus has formed it should be evacuated. Raise the milliamperage to the skin tolerance and treat continuously, if possible, until the process is localized. The active electrode should be applied directly over the inflamed gland and should be slightly larger than the area to be treated. The indifferent electrode should be large and placed on as nearly the opposite surface of the body as possible.

Diathermy to the Back

Illustration shows how two mesh electrodes, 5x9 inches in size, are positioned over abdomen and under back.

Bipolar current, 2200 milliamperes for 20 minutes.

This treatment is of extreme value in spastic conditions. If the muscles or ligaments of the back are too relaxed, while diathermy will relieve the pain temporarily and combat any inflammatory condition that may be present, the heat will further tend to relax the over-strained tissues and the pain will be worse as soon as the temperature of the parts treated returns to the normal. In this case, apply mild surging sinusoidal treatment, and then support the back by wide strips of adhesive extending from beneath the shoulder blade across the back to the opposite hip. Several strips should be applied so that the back is firmly supported.

(*Chapman Clinic.*)

Benign Skin Blemishes

The treatment of benign skin blemishes includes a wide variety of minor operations which are logically a part of the surgeon's work, but which frequently are neglected or ignored by the profession. Surgical diathermy offers the ideal means of treatment, combining in greatest degree all the requirements of the operator.

Surgical diathermy is applied easily and quickly, is under such perfect control that even the eyelid may be operated safely, is bloodless, leaves the least possible scar and calls for little after-treatment. It is suitable for all the following conditions:

Moles	Sebaceous Cysts	Tattoo Marks
Warts	Spider Nevus	Boils
Papillomas	Small Angiomas	Localized Skin Infections
Corns	Telangiectases	

In treating by surgical diathermy, the skin is first carefully sponged with alcohol and then dried. Local anesthetic is injected according to the surgeon's own technique, and the skin again dried. After time has elapsed to permit complete anesthesia, the operation is performed.

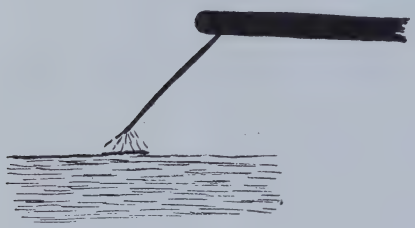


Fig. 1. Drawing showing the needle applicator held a short distance away from the skin, a shower of sparks passing to the lesion.

Fig. 2. Needle applicator inserted into lesion. Multiple punctures such as this are made until entire base is coagulated.

Where the lesion is small, the monopolar method is used, with the current passing from the machine to the patient and thence to the ground. For more current, use the bipolar method, with the current passing from the machine through the active electrode to the patient and thence through the inactive electrode back to the other pole of the machine. For the active electrode, a needle point electrode is used. For the inactive, the operator may use a large piece of block tin or mesh, affixed firmly to patient's back or chest; or the patient may hold the auto-condensation handle in his hands.

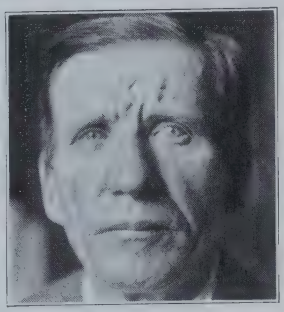
Benign Skin Blemishes—Continued

When the lesion is small and superficial, the needle electrode should be held about one millimeter away from the skin, allowing the current to spark across from the electrode to the lesion. The electrode should be moved about to avoid the danger of leaving pits where deeper destruction is effected. (Fig. 1, p. 42.)

Where the lesions involve the deeper layer of the skin, as in warts, it is preferable to push the needle into the tissue at one point at the base and coagulate, repeating this process until the entire wart has been treated. (Fig. 2, p. 42.)

For small lesions, no dressing is necessary and the patient may wash the face as usual. If an exudate occurs under the coagulated tissue it should be released.

Sebaceous cyst arising from the lower eyelid near the margin. Successfully removed by surgical diathermy.



Same patient as above, after treatment.

Multiple warts on palms of both hands. Successfully removed by surgical diathermy.

Photograph showing a small angioma in the lower lip successfully removed by surgical diathermy.

Benign Skin Blemishes—Continued

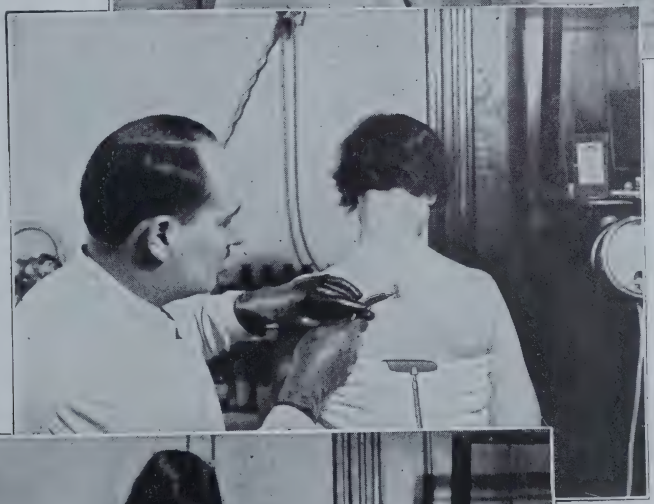
At Right—Unipolar current used for removal of benign skin blemish where the latter is very small. Patient holds auto-condensation handle in hands, connected to meter of machine or to radiator in office. Operator uses small needle electrode with just sufficient current to produce spark. Use foot switch for instant control.

Below—Another method of using the monopolar current in removing benign skin blemishes. Patient grasps auto-condensation handle; operator is using needle point electrode with hand switch.

Benign Skin Blemishes—Continued

Treatment

Diagnosis—
Large mole.
Method—
Surgical diathermy.
Anesthetic—
½ per cent novocaine solution.
Milliamperes--
1000 to 2000 at low-tension.
Indications—
All moles.



Above: Injecting local anesthetic.

Center: Coagulating with the needle-point electrode.

Below: Coagulated area after operation is completed.

Bursitis

This malady may affect either the subdeltoid or the subcoracoid bursae. Subdeltoid bursitis is distinguished by limitation of abduction and external rotation. In subcoracoid bursitis, the inner rotation as well, is limited. Pain over the shoulder and outer side of the arm characterize the acute cases.

Bursitis presents symptoms similar to those present in both tuberculosis and fracture, and sometimes may be distinguished from them only by careful diagnosis and X-ray examination. In arthritis, whose symptoms also resemble those of bursitis, pain is caused by *any* degree of abduction, while in bursitis some abduction is possible without pain.

Diathermy treatment of first degree bursitis has proved successful. When the disease can be seen and treated during this stage, which is characterized by congestion, recovery may be expected within two or three weeks. If the disease has passed this stage and adhesion and contraction are present, the probability of cure by diathermy alone, while still present, is lessened; and the period of treatment will occupy somewhat longer, probably up to two months. In the final stage, which is marked by atrophy of the shoulder muscles, diathermy may be employed for four to six weeks, with hope for recovery. If satisfactory results are not obtained in that length of time, the case is one for the surgeon.

Showing use of diathermy clamp in applying mesh covered sponge electrodes to shoulder.

The *internal* heat, which diathermy alone can produce, is highly advantageous in stimulating metabolism in the affected area. This is of special value, of course, in the early stage where congestion is present. Nearly every patient, after the first few treatments, will testify to a degree of relief from pain and to improved mobility.

Bursitis—Continued

At Left

Application of electrodes in bursitis. Mesh on shoulder, mesh cuff around upper arm.

Below

Showing shoulder electrode held in place by sandbag, arm electrode by elastic bandage.

Treatment in Bursitis

Diagnosis—
Bursitis.

Method—
Diathermy.

Electrodes—
As shown.

Milliamps.—
1000 to 1200.

Time — 20 - 30 min., daily first week, two or three times a week thereafter.

Cancer

This is both a local and a constitutional malady, and every patient must be diagnosed and treated with this in mind.

When discovered before the lesion has had time to develop, it is held by most physicians and surgeons that cancer is curable in most cases, excepting perhaps those of the alimentary tract. The great danger is from metastases, the development of which may be guarded against by the surgeon only through the exercise of the utmost care in operating upon the malignant growth. This danger is much less where diathermy is used than in operations with the knife, since the electric current sterilizes the surrounding tissues in the course of the operation. Moreover, there is never any possibility, in the electrical operation, of cutting through malignant growth into sound tissues and carrying cancer cells into the blood stream.

Surgical diathermy is the method of choice of a very large number of surgeons in the treatment of cancerous growths. Among its advantages are accuracy of control, immediate relief of pain, thorough and immediate sterilization of the wound, absence of shock, practically no hemorrhage, little danger of secondary hemorrhage, much less danger of extension and metastases than in use of the knife. Small lesions are removed quickly and painlessly by this method; in large operable lesions it has all the advantages mentioned above; in inoperable cases, so-called, surgical diathermy permits the surgeon to operate in otherwise inaccessible locations, and in cases of extensive vascularity and involvement where the sealing of lymphatics and blood vessels is essential.

Fig. A

Cauliflower Epithelioma

Successfully removed by surgical diathermy. Illustration A shows side view of the growth; B, same patient after operation showing wound healed.

Fig. B

Treatment of Epithelioma

Large indifferent electrode attached firmly to back, between shoulders. Local anesthetic, one-half of 1 per cent novocaine solution to which is added 1-1000 adrenalin solution. Active (needle) electrode is placed in contact with tissues and current turned on. As tissue blanches, needle is pushed slowly forward in tissue until destruction has occurred to desired depth. Current is then turned off, needle removed, and adjacent areas similarly treated until the operation is completed. Milliamperes, 700 to 2500; to be gauged by size of lesion, tissue resistance and current delivered by individual machine. Indications, all epitheliomata. Contra-indications, none. After-treatment, sterile dressings, X-ray or radium therapy, actino-therapy.

Cancer—Continued

Skin Cancer

Originally a small skin cancer, this growth had been treated by cancer paste, resulting in severe skin necrosis and rapid spreading of process, as shown in illustration at left. At right, completely healed following treatment by surgical diathermy.

Treatment

Surgical diathermy used to remove malignant tissue, technique as described on page 48. Also X-ray, skin cancer dosage, and actino-therapy, 3 to 10 minutes daily.

A B C D E F

Epitheliomata

Illustration A, epithelioma near ala of nose; B, after treatment by surgical diathermy. C, epithelioma of dorsum of hand; D, after treatment by surgical diathermy. E, epithelioma in axillary region; F, after treatment by surgical diathermy.

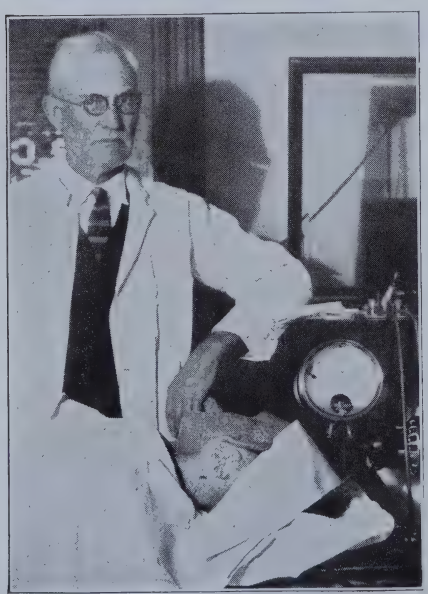
Treatment

Electro-coagulation by diathermy current, large indifferent electrode attached firmly to back, suitable needle electrode for active electrode. Local anesthetic, one-half of 1 per cent novocaine solution, to which is added 1-1000 adrenalin solution. Milliamperes, 700 to 1500 or more, depending on size of lesion, tissue resistance and machine used. Technique as on page 48. Indications, all epitheliomata. Contra-indications, none. After-treatment, sterile dressings, X-ray or radium therapy, actino-therapy.

Cancer—Continued

Carcinoma

Above, at left, destroying cancerous tissue by surgical diathermy, under chloroform anesthetic. Above, at right, fulguration of cancer (using electro-cautery). Below, illustration of large cancer developing in left mastoid.

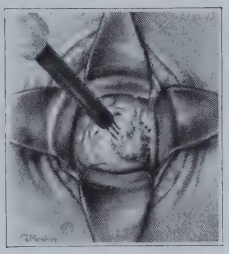


Treatment

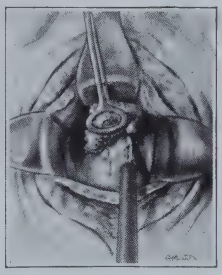
Fulguration and surgical diathermy, large indifferent electrode attached firmly to back, suitable small active electrode from Fischer Electrode Set. Anesthetic, chloroform. Milliamperes, 700 to 2500, depending on size of lesion, resistance of tissues and machine used. Post-operative treatment, X-ray and sterile dressings. Duration of post-operative treatment, indefinite. Indications, all accessible malignant growths. Contra-indications, none.

Cancer—Continued

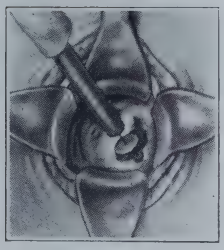
A



B



C



D

E

F

Surgical Diathermy in Bladder Malignancy

The above six illustrations show the various steps in this operation as performed by Gustav Kolischer, M. D., Michael Reese Hospital, Chicago. Detail of Dr. Kolischer's technique given below.

Treatment

Inert electrode, block tin, 20x10 cm., fastened under hips. Barnes bag inserted into rectum and distended by 200 c. c. of water, raising trigone and facilitating clearance of vesical base. Usual medial abdominal incision exposing anterior aspect of bladder; reduplication of peritonium stripped off by gauze dissection, exposing freely the outer anterior bladder wall. Then in the upper and lower angles of the wound two tension sutures are inserted which penetrate the bladder wall. The ends of the sutures are secured by metal clamps, whose weight helps to elevate the bladder, which in later stages makes the vesical cavity better accessible. Now the bladder is opened between these guy ropes by a transverse incision (illustration A). The transverse incision, while permitting free exposure of the vesical interior, offers the advantage of facilitating the suture of the bladder wound and at the same time prevents oozing of urine into the cavum retzii, in case the suture line should give. Then in the upper and lower angle of the vesical incision a fiber retractor

Cancer—Continued

is inserted. If one encounters an arboraceous bushy tumor, an electrode carrying 3 or 4 spikes is chosen, and by raining a shower of heavy sparks all over the crown of the tumor (illustration B) a superficial coagulation or carbonization is accomplished. If the tumor is pedunculated, its seared top is seized with forceps and gently pulled upward. The exposed pedicle is now severed with a galvanocautery closely to its implantation (illustration C). The resulting stump and the immediately adjacent area are now coagulated with a stamp-shaped electrode (D). The sideration and coagulation are carried on until a thoroughly dry scab results and no punctuate oozing is to be seen. The bladder is now mopped clean and the incision in the bladder closed by catgut sutures inserted in such a way as to guarantee a broad apposition and avoidance of impaction of the mucosa into the suture line (E). Over this suture a simple running suture is whipped to insure water tightness. Then the tension sutures supporting the abdominal wall are placed. Underneath these sutures a fine drainage tube, preferably of silver, is placed, parallel to the incision and protruding at each end of it (F). Then fascia and cutis are closed in the usual way and the guy ropes are tied. The patient either begins to urinate naturally shortly after the operation or if unable to do so is catheterized at regular intervals until natural function is resumed. Beginning at the end of the first week after the operation as a matter of extreme precaution the bladder is regularly flushed with an antiseptic solution.

For further discussions of various phases of Surgical Diathermy in cancer, see the following:

Milligan, W.:—Diathermy in Inoperable Pharyngeal and Epilaryngeal Malignancy. J. Laryngology and Otology 36:369, Aug., 1921.

Cumberbatch, E. P.:—Discussion on Surgical Diathermy.

Steward, F. J.:—Diathermy in Treatment of Malignant Disease. Practitioner 108:328, May, 1922.

Kolischer, G.:—Principles of Surgical Diathermy. Educational Series, H. G. Fischer & Co.

Kolischer, G.:—Surgical Diathermy and Radio-therapy in Cancer of Uterus. Surg. Gynec. Obstet. 35:227, Aug., 1922.

Patterson, N.:—Diathermy for Malignant Disease of Mouth, Pharynx and Nose With Notes on 17 Cases. British Med. Journal 2:56, July 14, 1923.

Wyeth, G. A.:—Endothermy in the Treatment of Accessible Neoplastic Disease. Annals of Surgery, 79:9, Jan., 1924.

Wyeth, G. A.:—Surgical Endothermy in Accessible Malignancy. New York M. J. 114:685, Dec. 21, 1921.

Wyeth, G. A.:—Endothermy in Treatment of Accessible Malignancy. New York M. J. 115:437, April 19, 1922. Illus.

Catarrh, Nasal

Diathermy gives relief in this condition. For technic see page 91. Treat for from five to fifteen minutes using either vacuum or non-vacuum electrode and only sufficient current to produce a sense of warmth to the inflamed mucous membrane.

Cellulitis

Diathermy is very valuable in this condition, i. e., it relieves pain, combats the infective agent, stimulates phagocytic activity, and hastens absorption. In pelvic cellulitis, the operator should give very mild treatments for fear of breaking down the devitalized tissue too rapidly and produce a rapidly spreading peritonitis; however, this is seldom more to be feared than the original condition. The Diathermy Clamp may be used, with very large mesh sponge electrodes front and back; or large block tin electrode may be employed. In all except pelvic cellulitis, where the physician must use his own discretion as to how rapidly and intensively he should treat the condition, the rule is to raise the milliamperage to the patient's skin tolerance and treat continuously until the condition is under control. This is usually attained in a few hours. Cellulitis, as a rule, means a very virulent and dangerous infection, and the physician is justified in giving very intensive treatments.

Application of Electrodes with Diathermy Clamp

Cerebral Anemia

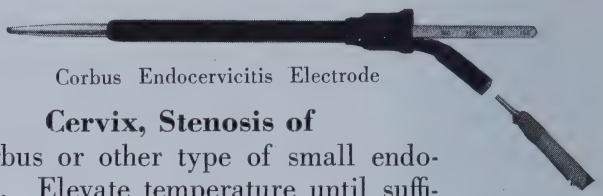
Mild diathermia may be tried in this condition; the results, however, are uncertain. Apply one electrode over the forehead, and the other to the neck posteriorly. Lower the head, elevate the body and treat for thirty minutes. The blood-vessels of the brain are not under direct vaso-motor control like those in other parts of the body, therefore diathermy is limited in its action.

Cerebral Hyperemia

Place large block-tin or mesh electrode over abdomen and have the patient lie on the autocondensation pad. Treat for twenty or thirty minutes at 600 milliamperes. This stimulates the vaso-dilator fibres and produces a congestion in the splanchnic area, automatically depleting the cerebrum. This treatment is very effective.

Cervicitis, Uteri

See section on Diathermy in Gynecology, pp. 68 to 71.



Corbus Endocervicitis Electrode

Cervix, Stenosis of

Use special Corbus or other type of small endocervicitis electrode. Elevate temperature until sufficient tissue destruction is produced to ensure a normal sized cervical opening. After the process has healed, sounds should be used occasionally in order to prevent cicatricial formation and a recurrence of the stenosis. This is a surgical operation.

Chancroid

The chancroidal bacillus or Bacillus of Ducrey is readily destroyed by mild elevations of temperature. Cleanse chancre with antiseptic soap and water. Use button-shaped electrode to infected area with large block-tin (indifferent) electrode under sacrum or buttocks. Elevate milliamperage to patient's skin tolerance and treat five or ten minutes, i. e., until the infected tissue begins to turn white. Care should be used not to produce a burn as a slough and perhaps a spreading of the infection would follow.

Chilblains

Diathermy is of value in the treatment of chilblains after the circulation has been restored to the frozen tissues. Begin treatments mildly and treat daily for from twenty to thirty minutes. Electrodes are applied as in Diathermy to Ankle, pp. 31 to 33, but with electrodes somewhat closer together to localize heat in the affected area.

Cholecystitis

Diathermy has the same value in the treatment of an inflammation of the gall-bladder as in other conditions, however, the physician must keep in mind the danger of rapidly breaking-down a purulent gall-bladder and producing a general peritonitis in a portion of the abdomen where it is rapidly fatal as a rule. Technic, same as in Gallstones, pp. 66 and 67.

Coccygodynia

If this is produced by an injury to the bone or an inflammation, diathermy will prove useful in its treatment, however, there is a large number of patients in whom no pathological condition is apparent and the pain is only a symptom of a neurotic diathesis, and the psychological effect is all that is gained from any treatment. Apply one electrode over painful area and another—much larger—electrode over the lower abdomen. Treat for twenty minutes at 1500 milliamperes.

Coagulation of Tissues

For technic, see Surgical Diathermy, pp. 17 to 21.

Colic

See pp. 66 and 67.

Colitis, Mucous

Place large—(inactive)—electrode underneath sacrum. For the active electrode use block-tin or silver-mesh 4x8 inches in diameter. Apply the active electrode first to the ascending colon, then to the transverse, and last to the descending colon. Treat ten minutes in each position. Raise the milliamperage to the patient's skin tolerance and treat daily. After treatment flush the colon with warm boric acid solution using the long colon tube. The Morse Wave Generator, air-cooled ultraviolet lamp, and general medicinal measures must not be neglected in treating this condition, which is often very slow to respond to any form of treatment. A combination of physical measures with medicines, however, usually produces speedy therapeutic results.

Conjunctivitis

Use special vacuum or non-vacuum eye electrodes. Treat from five to ten minutes using low milliamperage. For application of electrodes see page 59.

Corns

See Benign Skin Blemishes, pp. 42 to 45.

Coryza

Diathermy gives relief in this condition. For technic of treatment, see Diathermy to the Nose, page 91. Treat for five to fifteen minutes using either vacuum or non-vacuum electrode and only sufficient current to produce a sense of warmth in the inflamed mucous membrane.

Cystitis, Acute

Place standard size mesh electrode over lower abdomen, with larger indifferent electrode underneath sacrum. Raise milliamperage to patient's skin tolerance and treat for from thirty minutes to one hour daily. Some advantage is gained by having the bladder distended during treatment. The patient voids immediately after the treatment, thereby mechanically washing out the inflamed bladder.

Cystitis, Chronic

The treatment of chronic cystitis does not differ from that of the acute, except that the treatments may not be so prolonged and may be given three times weekly. It is often necessary to

wash out the bladder after treatment with a warm boric acid solution as many of these patients have retention of urine.

Diabetes, Insipidus

Local diathermy is not indicated in this condition; however, on account of the neurotic element usually present, massage of the spine, using the vacuum electrode and a mild spark, may be tried.

Diabetes, Mellitus

Most electro-therapists condemn the use of diathermy in this malady. However, mild applications of diathermy may stimulate an impaired pancreatic gland to function more rapidly and benefit may result. Apply standard size (5x6 in.) electrodes front and back and treat daily, using about 1000 milliamperes of current. Any untoward effects would show that the treatment was contra-indicated and it should be abandoned. If benefit is obtained, gradually elevate the amperage to the patient's skin tolerance and treat for thirty minutes or longer daily. Diathermy may be tried in the treatment of diabetic ulcers, observing the same precautions as mentioned above, and applying the electrodes to conform to the part being treated.

Diarrhoea

Diathermy may be used to soothe the inflamed intestines and for its specific action on the bacterial flora of the intestinal tract. Apply large block-tin or mesh electrodes over the back and abdomen and treat for thirty minutes daily. In the presence of appendicitis or intestinal obstruction, this treatment is contra-indicated.

Duodenal Ulcer

Diathermy is used in duodenal ulcer to relieve the pain, and to promote healing. Treat for thirty minutes daily elevating the milliamperage to the patient's skin tolerance. If the patient experiences a vertigo or feeling of malaise during or after treatment account over stimulation of the solar plexus with splanchnic congestion, lower the amperage. Apply a standard (5x6 in.) mesh electrode above the source of the pain with the larger, indifferent electrode underneath the shoulders or spine.

Dysentery

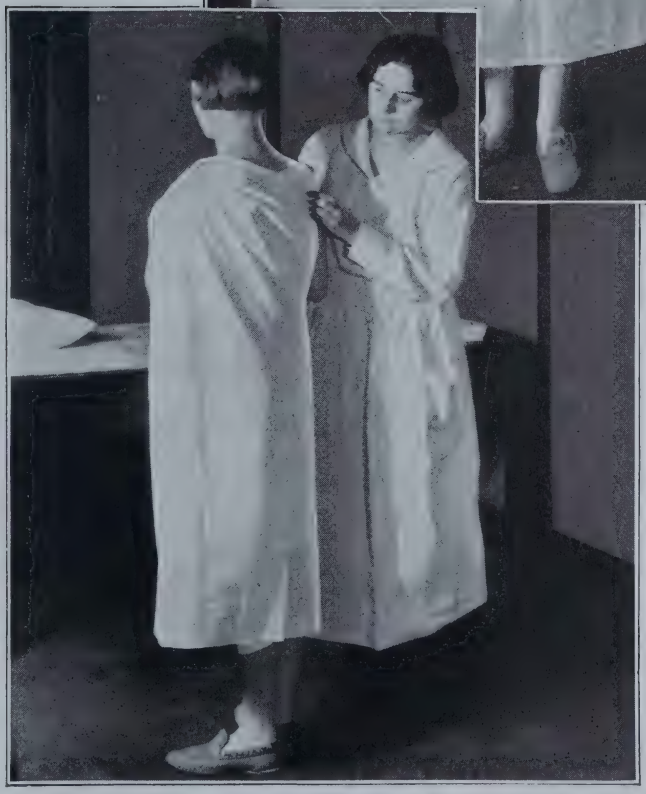
See Diarrhoea, above.

Dysmenorrhoea

See section on Diathermy in Gynecology, pp. 68 to 71. The treatments should be given daily.

Draping Patient Before Treatment

At Right: — Method of draping doubled sheet around patient.



At Left: — Showing draping completed and sheet being fastened in back.

Diathermy to Ears

Above:—Diathermy to Ear, using non-vacuum ear electrode. unipolar current, 3/8 in. spark to produce hyperemia.

At Right:—Diathermy Through Ears, hand electrode on each hand, forefingers in ears. Bipolar current to patient's tolerance, 20 minutes. A warming treatment that has been largely superseded by others employing special electrodes. It is considered bad technic to allow the patient to do the treating.

Diathermy to Eye

At Right: — Large indifferent electrode is connected to back of patient's neck, mesh sponge electrode over eye. Current (bipolar) to patient's tolerance for 20 minutes.

At Left:—Modified Diathermy to Eyes, using a double eye electrode over closed lids, large indifferent sponge mesh electrode at back of neck. Bipolar current; 200 milliamperes for 10 minutes.

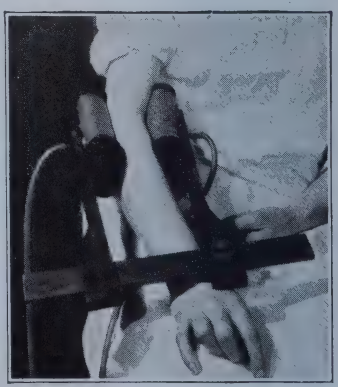
Elbow, Fracture of

After the fracture has been properly reduced, diathermy is of exceptional benefit in treatment of fractures of this type. Internal heat reduces the edema and pain, and also minimizes the danger of ankylosis.

It is the edema and the swelling, in fracture of the elbow, which is the cause of so much excruciating pain. Therefore, the first efforts in diathermy treatment should be directed toward preventing this edema, or reducing it as much as possible.

If the injury is such that it may be treated in this manner, diathermy may be given by the application of electrodes as illustrated below and on the next page. After a thirty to forty-five minute treatment, the muscle spasm is relieved, the efferent channels are opened and edema and swelling reduced to a minimum. With these conditions relieved, the pain is greatly lessened. Whatever form of splint is required may then be applied and the joint immobilized.

After healing has begun, ankylosis and loss of function may be prevented in great degree by instituting surging sinusoidal treatment, very light at first, with electrodes above and below the affected part. After healing is completed and the splints are removed, diathermy combined with massage and manipulation will aid greatly in restoring full mobility.



Showing mesh covered sponge electrodes held in place by diathermy clamp.

Proper use of the electrical modalities in fracture of the elbow will avoid the permanent disabilities which sometimes follow injuries of this nature.

Various methods of treatment, with technic, are given on the following pages.

Applying Electrodes to Fractured Elbow

At Left—Mesh sponge electrodes applied laterally.

Below—Method of bandaging electrodes in place with elastic bandage.

Treatment

Diagnosis—Fracture of elbow.

Method—Diathermy.

Milliamps.—800-1200.

Electrodes—Mesh sponge.

Time—30 to 45 minutes.

Diathermy to Elbow

At Right: Showing two mesh cuff electrodes attached above and below elbow, 800 to 1500 milliamperes (patient's tolerance) for 20 to 30 minutes.

Diathermy to Elbow

At Left: Mesh cuff electrodes in place and bandaging being completed. This method is similar to that described on p. 63.

Diathermy to Elbow

At Right—Showing two half-cuff electrodes being placed one on upper side of arm and one on lower, equidistant from elbow.

Diathermy to Elbow

At Left—Same treatment as above, showing how electrodes are held in place by elastic bandages, 1000 to 1500 milliamperes, 20 to 30 minutes.

Earache

See pp. 58 and 104 for technic. Treat continuously until relieved.

Empyema

The treatment for empyema is the same as for pneumonia. Diathermy is useful to relieve the pain, localize the condition, and for its specific action on the bacteria. As soon as the empyema is firmly established, it should be opened and drained.

Endometritis

See section on Diathermy in Gynecology, pp. 68 to 71.

Enteritis, Chronic Catarrhal

Diathermy may be used to soothe the inflamed intestines and for its specific action on the bacterial flora of the intestinal tract. Treat 30 minutes daily, with large block tin or mesh electrode over back and abdomen. Contra-indications, appendicitis or intestinal obstruction.

Epitheliomata

See Cancer, pp. 48, 49.

Epididymitis

Apply Corbus epididymitis electrode and treat daily or twice daily—twenty minute periods—until condition is relieved.

Erysipelas

Apply electrodes to conform to part being treated. Treat continuously until the process is under control, then for thirty minute periods, daily. Raise milliamperage to patient's skin tolerance.

Felon

Treat as nearly constantly as is practical until pus forms, then incise and drain. For application of electrodes see pp. 78 and 79.

Finger, Diathermy to

See Diathermy to Finger, pp. 116, 117.

Finger Infection

See Infected Finger, pp. 78 and 79.

Fissure in Ano

Treat by direct fulguration or use cautery. Dress with oily antiseptic dressing. Healing is usually complete in one week.

Fistula in Ano

Incise widely. Cauterize diseased tissue with cautery, and pack loosely with antiseptic gauze. Encourage healing by granulation.

Furunculosis

Use button-shaped electrode to each furuncle. Treat ten minutes twice daily until slough forms, then incise and drain. Give general irradiations with the air-cooled ultra-violet lamp to prevent recurrence.

Gangrene

The physician may use his own discretion about treating gangrene by diathermy. Its application, however, often hastens the formation of the line of demarcation and limits tissue destruction.

Gastralgia

Use same treatment as for duodenal ulcer, page 56.

Gastric Ulcer

Use same treatment as for duodenal ulcer, page 56.

Gleet

See Gonorrhea, below.

Gonorrhoea

Heat is a specific for all gonorrhoeal infections; the only problem that confronts the physician is the effective application of diathermy to the infected area. This problem has been solved in the female; refer to the section on Diathermy in Gynecology, pp. 68 to 71. In the male, however, this problem assumes greater proportions. No procedure that will apply in all cases has been perfected as yet, but the methods mentioned below have met with more or less success in the hands of the originators.

Roucayrol uses a special urethal electrode which is inserted inside the penis with an indifferent electrode over the abdomen. This special electrode carries a thermometer and Roucayrol treats for twenty minutes daily with the thermometer registering 45 degrees Centigrade. He claims excellent results.

Corbus & O'Conor also use the special endo-urethal electrode and recommend temperatures in excess of 106-108 degrees Fahr., for thirty minutes. The indifferent electrode is placed over the abdomen or sacrum.

Chapman wraps the anterior third of the penis in silver-mesh cut from strips for the purpose. The penis is placed in a small saucer over the pubis to prevent short-circuiting the current through the abdomen. A large indifferent (block-tin) electrode is placed underneath the patient's hips to complete the circuit. He treats for sixty minutes daily at the patient's skin tolerance. Antiseptic liquid soap is applied freely to the active electrode to insure a good contact during the treatment.

Another method that has met with some success is to suspend the penis in a small jar containing salt solution which acts as the active electrode. In this treatment care must be exercised to prevent burns as the glans penis is almost devoid of heat fibres and unless a considerable portion of the penis is immersed in the solution, a scalding may result.

Gall Stones, Colic

Gall stones, so-called, result from the formation of balls or stones through the precipitation of cholesterin or other salts from the bile. These formations vary in size and density, in the acute manifestations of the disease often attaining sufficient size to produce obstruction of the ducts, ulceration and perforation of the walls. As secondary results, jaundice, cirrhosis and intestinal obstruction may be caused by gall stone disease.

Gall stone disease—cholelithiasis—sometimes is difficult to differentiate from other diseases causing pain in the upper right quadrant and under the right shoulder blade. Among these are gastric colic and intestinal colic, both of which are amenable to the same diathermy application that is of benefit in gall stones.

Naturally, after diagnosis, proper medication and, if necessary, surgical intervention are prescribed as indicated by the nature of the individual symptoms. Diathermy is of real help to the physician, however, in alleviating the acute pain sometimes present, in promoting improved metabolism in the affected area and in dissipating splanchnic congestion.

Placing the electrode in dorsal region

Application of Electrodes in Gallstones and Colic

A large tin plate electrode is applied under the seat of pain in the dorsal region, another of mesh is placed anteriorly so as to include painful area and held in place by sand bag.

Treatment

Diagnosis—Severe pain in upper quadrant and passing back under right shoulder blade.

Supplementary diagnosis—X-ray to determine whether gallstones are present.

Treatment—Medical diathermy.

Electrodes—Large tin plate posteriorly, large mesh anteriorly.

Milliamperes—800 to 2200.

Time—Often as required to relieve pain.

Indications—Severe pain.

Contra-indications—Temperature, increase in symptoms.

Diathermy in Gynecology

By W. B. CHAPMAN, M. D.

Diathermy, when used in the treatment of inflammatory diseases of the female pelvis has the following general effects:

1. It alleviates pain. 2. It has a localized action. 3. It increases the blood-supply to the part. 4. It leaves no bad after effects. 5. Bacteria are either killed or attenuated in virulence according to their ability to resist high temperatures. The gonococcus is attenuated in virulence and prevented from reproduction by a temperature of approximately 104 degrees Fahrenheit.

On account of its analgesic action, diathermy is indicated in painful menstruation. On account of its vaso-motor effects, it is indicated in amenorrhoea. Its greatest value, however, lies in the treatment of inflammations in which it has a specific action upon the infective agent as well as in producing the general beneficial effects already mentioned. The technic in all of these conditions is approximately the same. Any variation from the routine treatment is given underneath specific title of disease.

From what has already been said, it is apparent that, in the treatment of gynecological conditions by diathermy, we are more concerned with the location of the disease than with its specific cause. We are aware, however that pathogenic bacteria behave differently when exposed to heat, and I will mention the resisting power in vitro of a number of the microorganisms that are found most frequently in pelvic infections.

Streptococci—110-125 degrees F., in from 10 to 20 minutes.
Staphylococci—140 degrees F., in approx. 30 minutes.
Tubercle bacilli—140 degrees F., in approx. 20 minutes.
Gonococci—140 degrees F., in approx. 30 minutes.

You will note that the thermic resistance of the gonococcus in vitro is as high as that of any of the other pathogenic microorganisms. This is significant as it has been found that in vivo the gonococcus is prevented from reproduction by temperatures in excess of 104 degrees F., and Corbus & O'Conor claim that 108 degrees F., destroys the micro-organism in 30 minutes. Ehrich states that the time is much less, but the importance of these factors is merely to determine the duration of the treatment, and it would appear that where it is possible to elevate the temperature of the tissues to 108 degrees F., 30 minutes time is sufficient to destroy all common types of pathogenic bacteria.

Diathermy in Gynecology—Continued

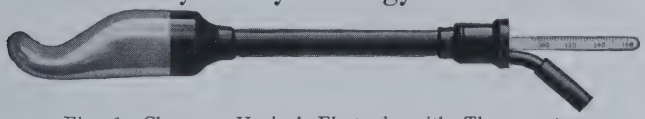


Fig. 1. Chapman Vaginal Electrode with Thermometer.

The Chapman Vaginal Electrode

This instrument is furnished in two sizes, and comes either with or without the thermometer attachment. For accurate work, however, the thermometer is absolutely essential. It gives an absolute check on the temperatures being generated inside the tissues at all times, prevents accidents, and eliminates all sources of error.

Application of Electrode

In the treatment of buboes, perineal abscesses, ulcers, vulvitis, anterior vaginitis, anterior urethritis, etc., a mesh sponge applied directly to the infected area with a larger indifferent electrode over the abdomen or the sacrum is indicated. In the treatment of disease of the internal female organs, however, the special Chapman Vaginal Electrode should be used.

This instrument is introduced edgeways into the vagina and, after insertion, is rotated into position. When properly applied it automatically engages the cervix within the cervical bowl and elevates and supports the uterus, while the vulva closes over the insulated vulval groove and helps to hold it in position. These factors are of practical importance as all other types of vaginal electrodes will work out of the vagina during treatment. The knees are flexed and widely separated while the electrode is being inserted, but the legs are extended during the treatment, the attachment cord from the vaginal electrode passing down between them to one of the binding posts of the D'Arsonval connection.

Precautions in Applying Electrodes

The vaginal electrode should be lubricated with glycerine or liquid soap for introduction into the vagina. The surface underneath external electrodes should be shaved and the skin and undersurface of the electrode coated with soap lather. The umbilical depression underneath the indifferent electrode should be filled with liquid soap and all electrodes applied snugly. These factors will cause a variation of from five to ten degrees in the heating effects obtained within the tissues and make for the success or failure of a valuable therapeutic agent.

Diathermy in Gynecology—Continued

The Indifferent Electrode

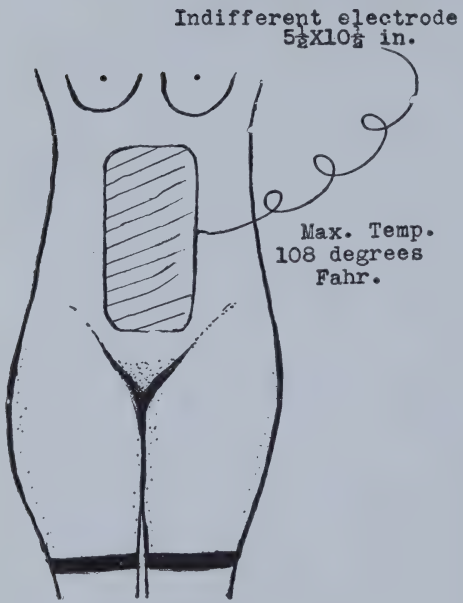


Fig. 2. Large indifferent electrode.

The application of the indifferent electrode is almost as important as that of the active or treating electrode. Fig. 2 shows the type of electrode that may be used and its proper location. This electrode is of block-tin and is 5½x10½ inches in size. It will allow an elevation of temperature inside the vagina of 108 degrees F., which is sufficient to secure the required therapeutic effects. By using an extremely large indifferent electrode as in Fig. 3, intra-vaginal temperatures of from 110 to 113 degrees F., may be obtained. I have found, however, that tissue necrosis is threatened by temperatures around 112-115 degrees F., and I do not recommend temperatures above 110 F., for general treatments.

Fig. 3.—Extra large indifferent electrode.

Diathermy in Gynecology—Continued

Contra-indications to Treatment

Where there is a walled-off abcess within the pelvis, this treatment should not be used. Chief of these is an old pyosalpinx or an abcess in the Cul-de-sac of Douglas. Either of these conditions if treated by diathermy will break down rapidly and rupture inside the peritoneal cavity. These conditions may be detected by a careful pelvic examination. The palpation of a mass to either side of the uterus, or even a rigidity with slight deviation of the uterus to one side or the other, combined with some tenderness on pressure, should make one suspicious of an old pyosalpinx and if diathermy is used at all we must proceed very carefully, as one normal treatment will often suffice to set it off. Even if there is no pus present at the beginning of treatment the increased heat to the infected area will cause a rapid breaking down of the devitalized tissue with pus formation, and if the direction of least resistance is towards the peritoneal cavity it will rupture into it with a consequent peritonitis with all of its attendant dangers. In the event of this, the only recourse is operation and drainage.

Treatment of New Growths

Surgical diathermy or endothermy is of extreme value in the removal of neoplasms of the female organs, many of which show a rapid tendency to malignment degeneration. The technic is the same as for the treatment of neoplasms elsewhere and is described under the head of Surgical Diathermy.

The illustration below shows a typical Diathermy treatment of the type mentioned by Dr. Chapman. Indifferent electrode is applied to the abdomen, active electrode inserted in the vagina, with the electrical cord extending downward between the patient's knees as mentioned in Dr. Chapman's description of the technic. Cord thus aids in holding bowl of electrode firmly against cervix.

Hemorrhoids

By W. B. CHAPMAN, M. D.

Hemorrhoids or piles may be classified according to their location, appearance, cause, character, or the symptoms that they produce. To the surgeon, however, the only question of importance is their safe and effective removal.

During the past three years I have performed quite a number of hemorrhoidal operations by surgical diathermy or electro-coagulation, and the success that has been attained convinces me that in the majority of cases this is the operation of choice.

The technic is simple and is as follows:

Cleanse the field and paint over with Tincture of Iodine. If the hemorrhoid is inside the rectum, it may be exposed in a woman by inserting a finger inside the vagina and exerting pressure on the rectum. If a man, the cup and suction apparatus of the high frequency machine is quite effective. When the pile is exposed, grasp it with the thumb forceps (Fig. 1) and, using a 2 per cent novocain-adrenalin solution, inject a few drops underneath the tumor (Fig. 2). The thumb forceps should be rubber-tipped to prevent pinching. I usually cut short lengths from an old rubber catheter and slip over the ends of an ordinary tissue forceps.

For the operating instrument a sharpened Plank needle is very good. Any kind of a needle will do, but I employ the short pointed electrode that comes with the Diathermy operating set. This becomes the active electrode of the D'Arsonval circuit while for the indifferent electrode I employ a large piece of block-tin which is warmed and held in place by sand-bags. No soap lather is required for contact and it makes little difference where it is applied. It is also possible to use the auto-condensation pad or handle as the indifferent electrode, but requires much more current and the results are not so uniformly satisfactory.

Using a high frequency machine at the lowest tension, set the controls so that the meter will read about two thousand milliamperes when the two electrodes are brought into contact with each other. With the current adjusted, the tumor anesthetized, and the indifferent electrode in place, insert the point of the operating needle into the pile and, using the foot-switch, apply the current

until the pile turns a steel-grayish color (Fig. 3). This only requires a few seconds. The injection solution inside the pile becomes boiling hot and by scalding destroys the endothelial lining of the dilated blood-vessel causing a coagulation and consequent disappearance of the tumor by absorption.

Hemorrhoidal tabs or "sentinel piles" are largely fibrous tissue and should be coagulated until white. They separate after about ten days and the base heals over with a soft, pliable scar. After coagulation, the hemorrhoids will protrude from the rectum and should be bathed twice daily or oftener with hot boric or cresol solution. This limits the swelling, prevents infection, and relieves pain and soreness.

If there is much after-pain prescribe a suppository of cocoa-butter containing one grain of opium and from ½ to 2 grains of belladonna. These suppositories are on the market and can be secured from any druggist on prescription. Instruct the patient to insert one suppository into the rectum on retiring, and they may be used as often as is required to ease pain. An ointment containing morphine sulphate gr. 5, tannic acid gr. 10, in one ounce of zinc oxide is also useful.

By the above procedure it is possible to treat successfully any case of piles and the patient may proceed about his daily work. It is best to coagulate only one tumor each time, the patient returning for another treatment, as soon as the soreness from the last is gone. The unfortunate thing about the treatment of hemorrhoids by surgical diathermy is that, especially, inexperienced operators will overtreat and produce so much tissue destruction at one time that the patient is completely incapacitated for several days.

Three or four treatments usually suffice to clean-up even severe cases, as the coagulation of one tumor often impairs the blood-supply to several other hemorrhoids, causing them to disappear also; I have in mind a case where one treatment cured a case of hemorrhoids that was so bad that the man was incapacitated from earning a livelihood and was confined to his bed a large portion of the time.

Another thing, with this operation, there is not the danger of hemorrhage, embolism, or infection that attends the old operative procedures, and the end-results are more satisfactory.

Hemorrhoids—Continued

Exposing the pile by means of thumb Forceps

Injecting the anesthetic

Coagulating the pile by means of the needle electrode

Headache

Massage gently with vacuum electrode and mild current until relief is obtained. Migraine and severe headaches will require the addition of anodynes.

Hip Joint Disease

See Tuberculosis of The Hip, pp. 110, 111.

Hyperemia, Cerebral

See Cerebral Hyperemia, page 53.

Hysteria

Give massage to spine using surface electrode and 1/4 inch spark. Treat for fifteen minutes moving the electrode slowly up and down the spine. If the patient does not respond, try raising the electrode from the surface and give several sharp sparks to the skin. See page 87 for application of electrode.

Impotence

Place electrode over pubis and one underneath sacrum. Treat for thirty minute intervals. Elevate to about 1500 ma.

Intercostal Neuralgia

Diathermy is especially indicated to relieve the pain and promote a healthy hyperiemia. Place electrodes where indicated and treat for thirty minutes. Skin tolerance.

Iritis, Acute or Chronic

Special vacuum or non-vacuum electrodes are used in diathermy treatment of iritis. Treat for short periods only, five to ten minutes, using low milliamperage. Application of electrodes is shown on page 59.

Keloid

These fibrous growths are easily removed by surgical diathermy, but will recur unless the x-ray or radium is used to prevent it. For technic, see section on Benign Skin Blemishes, pp. 42 to 45.

Keratitis

Diathermy is useful in this disorder. Treatment is with the special vacuum or non-vacuum electrodes, applications for five to ten minutes, using low milliamperage. See page 59 for application of these electrodes.

Hypertension

High blood pressure may be caused by infection, by deranged metabolism, by an excessive use of alcohol or tobacco, by specific disease—to name some of the more prominent causes. Any condition which adds an excess of waste, of poisons within the system, may well result in hypertension, followed by derangement of arteries, kidneys and heart unless measures are taken to remove the excess load from these organs.

Obviously the first essential in the treatment of hypertension, after diagnosis has been confirmed, is to find and eliminate, one by one, *all* the causes of the condition. Here the cooperation of the patient is essential and invaluable, not only in securing a full history, but in careful attention to diet and living conditions. Faulty diets and elimination; harmful habits; local infections; specific disease—all these must be checked up carefully and treated comprehensively. It is of little use to reduce blood pressure by treatment if the patient continues to increase it by faulty living.

Corrective measures having been taken to eliminate the causes, auto-condensation is the method of choice of the physiotherapist in the treatment of hypertension. Auto-condensation promotes an increase of tissue changes and an improved metabolism, with a resultant increase in elimination and removal of the basic cause of the patient's condition. Properly used, unless contra-indicated, this modality will be found of great value to the physician in all cases of high blood pressure.

Emphasizing the need for removing the underlying causes of hypertension, Dr. Curran Pope says:*

"When it comes to permanently lowering blood pressure, I wish to unqualifiedly take the stand that auto-condensation by itself will not do anything more than temporize a little bit. You will be simply compelled to reorganize the patient and the patient's life and the causes that are active if you wish to get any permanent reduction in blood pressure.

"When that is done it is astonishing sometimes to see how it will come down under auto-condensation."

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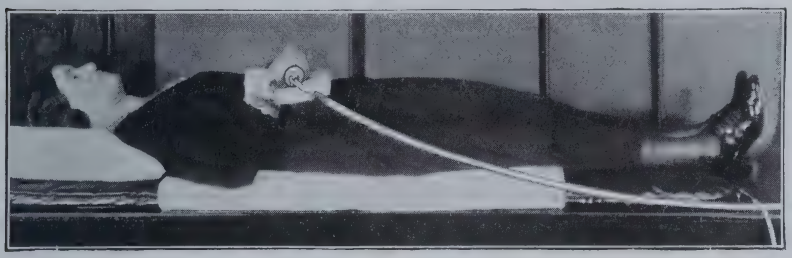
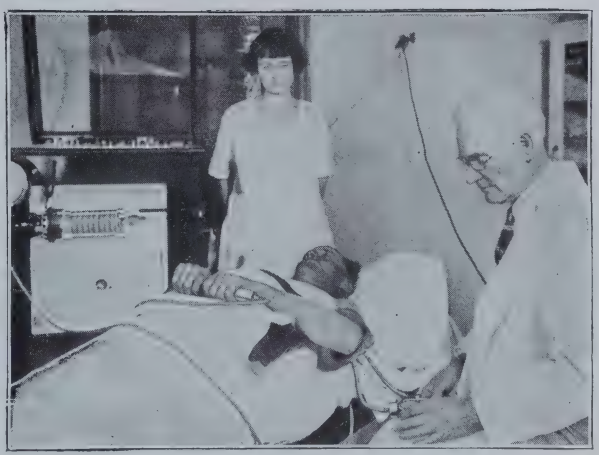
*Physiotherapeutic Lectures, Second Edition, p. 237.

Hypertension—Continued



Above—Patient lying on auto-condensation pad and holding auto-condensation handle in hands.

At Right—Another view, patient in same position, physician checking blood pressure during treatment.



Treatment for Hypertension

Diagnosis—High blood pressure.

Method—Auto-condensation.

Electrodes—Patient lies on auto-condensation pad and grasps auto-condensation handle.

Milliamperes—600.

Duration—20 to 30 minutes.

Frequency—Daily or three times weekly, according to reaction of patient.

Indications—Hypertension.

Contra-indications—Myocarditis, valvular heart disease, nephritis.

Infected Finger

Heat, applied *through* the infected area, is the diathermic treatment for infections of this type. It has been found most satisfactory and efficatious, giving prompt relief to the patient in most cases and promoting rapid healing through increased metabolism in the infected area. In industrial cases, particularly, where it is essential to get the patient back on the job without undue delay, diathermy treatment is used with excellent results. Pus is not a contra-indication in finger infections, although when it is present drainage should be established.

Application of Electrode

A mesh cuff electrode is shown below; it is held in place by a loose bandage, preferably of some elastic material, to guard against the swelling caused by the heat of the treatment. The affected finger is immersed in a pan of salt water in which the other electrode is placed.

Infected Finger—Continued

Treatment

Diagnosis—Pain, swelling, heat, redness.

Modality—Medical diathermy.

Milliamperes—Skin tolerance.

Method—Electrode on wrist, other electrode in pan of salt water; immerse finger to complete circuit.

Time—Treat almost constantly until process is under control.

Indications—All infections of this nature.

Contra-indications—None.

Application of Electrode

Diathermy hand electrode is applied to wrist, indifferent electrode in pan of salt water in which finger is immersed. Except for the use of the hand electrode, this treatment is identical with that shown on preceding page.

Knee Joint Injuries

Treatment of these injuries should be begun as soon as possible after the injury occurs, before edema and swelling have taken place. To be sure, these conditions are by no means a contra-indication for diathermy treatment, but if they can be forestalled, much pain and trouble may be avoided.

It is well, always, to confirm diagnosis by X-ray pictures, to make sure that a small fracture is not overlooked. This having been done, diathermy treatment is instituted.

Be careful, in applying the electrodes, to use a bandage that will not become tight as the limb swells. Free circulation is essential. Employ the diathermy treatment, as described in detail on the next page, at frequent intervals until the edema and swelling have been checked or abated, which may take 36 or 48 hours. The joint may then be bandaged in the usual manner, and the patient will experience a minimum of pain and inconvenience during convalescence.

Three or four days later, sinusoidal treatment may be begun, applying electrodes above and below the bandages and using very light stimulation at first, until healing is well under way. In this manner, fibrosis, ankylosis and muscular atrophy are avoided.

Even in cases first seen several weeks or months after the injury, sinusoidal treatment combined with massage and manipulation will be found of distinct value, as will diathermic heat, applied before treatment to relax the parts.

Treatment

Symptoms—Pain, swelling, heat, discoloration.

Diagnosis—Sprain.

Method—Medical diathermy.

Electrodes—Mesh or tin plate cuff, above and below knee.

Milliamperes—Skin tolerance, 800 to 1200.

Time—20 to 30 minutes.

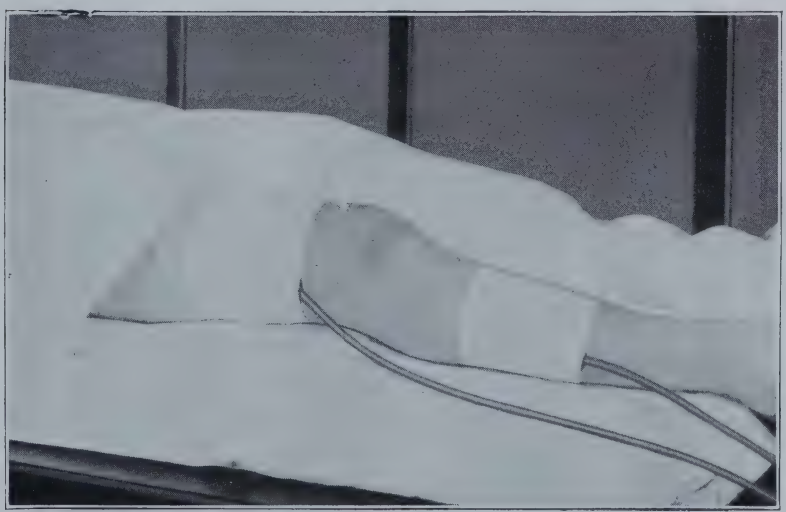
Indications—All cases.

NOTE—For SINUSOIDAL treatment, apply electrodes as above, using moderate wave and uniform interruptions.

Diathermy to Knee

At left:—Half cuffs of block tin, 5x3 in., equidistant above and below knee, one to upper and one to lower aspect of leg.

Below:—Electrodes in place and held by elastic bandages. Give 800 to 1200 milliamperes for 30 minutes.



Diathermy to Knee

Above:—Double cuff electrodes equidistant above and below knee. Held in place by loose bandages. 800 to 1200 milliamperes for 30 minutes.

Below:—Mesh sponge electrodes applied to either side of knee and held in place by elastic bandage. Mesh 4½x3 in. Give 800 to 1200 milliamperes for 20 minutes.

Laryngitis

Apply electrodes externally and on opposite sides of the neck. Treat for twenty minutes using a mild current.

Leukocythemia

See Anemia, p. 28.

Leukorrhea

See section on Diathermy in Gynecology, pp. 68 to 71.

Lupus Vulgaris

Several electrotherapists advocate the removal of these tuberculous lesions by surgical diathermy exactly as if they were malignant growths. For technic, see section on Cancer, pp. 48 to 52.

Lymphangitis

This condition is commonly called "blood-poisoning" by both the laity and physicians. Place electrodes at points so that the high frequency current will traverse the area of infection. Treat almost constantly until the process is localized. Elevate the amperage to the skin tolerance.

Lymphadenitis

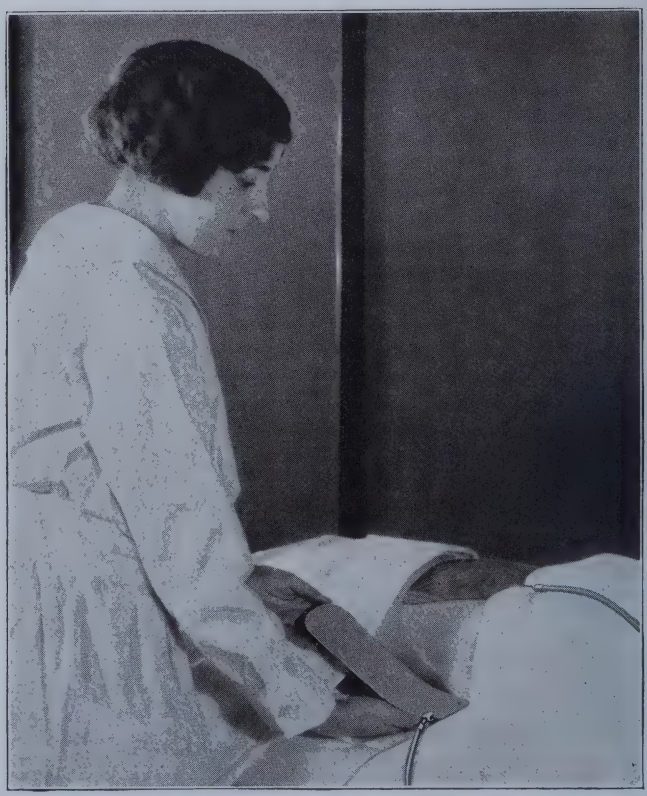
Diathermy is of the same value in the treatment of lymphadenitis as in all other infections. However, where the inflammation is not very active, physicians often attempt to abort the process by cold applications or by painting the swollen glands with Tr. Iodine. If these abortive processes fail, or if the glands are actively inflamed, they may be broken down by diathermy, (heat) with the formation of pus, which should be evacuated. Apply electrode slightly larger than the inflamed gland with very large inactive electrode on opposite side of body. Treat as nearly constantly as possible until the devitalized tissue dissolves.

Lumbago

Pain and soreness of the lumbar muscle, uncomplicated by other symptoms indicating maladies more serious and deep seated, is generally classed as lumbago. Some physicians prefer not to use the term. To the patient who complains of "lumbago" they will reply, "there is no such thing as lumbago; you have a lame back"—and proceed to diagnose the real trouble. Be that as it may, soreness of the lumbar muscle is quite common, and yields readily to diathermy treatment.

Below:—Applying Electrodes

A large mesh electrode is applied to the abdomen and a large block tin electrode is used under the lumbar region.



Treatment of Lumbago

Symptoms—Pain in back, impairment of functions.

Diagnosis—Lumbago.

Method—Medical diathermy.

Electrodes—Large tin plate over lumbar region; large mesh anteriorly.

Milliamperes—1800 to 2500, tolerance of patient.

Time—30 minutes daily.

Indications—All cases of lumbago.

Below:—Electrodes in Place

This illustration shows the large tin plate electrode slipped into place under the lumbar region, the mesh electrode on abdomen.

Malnutrition

Mild diathermic applications to the back and abdomen, combined with proper dietetic procedures, are indicated.

Melancholia

Employ same treatment as for Hysteria, p. 75.

Menstruation, Irregular

See Diathermy in Gynecology, pp. 68 to 71.

Migraine

Diathermy is often very useful in this exceedingly painful condition. Apply small electrodes, or use the fingers for treating about the head at the points of exit of the sensory nerves. Give treatments daily. When the attack is on, only strong anodynes will give any relief. Use a mild current and treat 20 minutes daily.

Moles

See Benign Skin Blemishes, pp. 42 to 45.

Mucous Colitis

See Colitis, p. 55.

Myocarditis

If diathermy is used at all, employ very mild current. Most men do not exceed 100 M. A. Treat for long periods. The indications are the same as in all infections, but the results are not very satisfactory and the treatment is not without some danger. Diathermy in myocarditis not strongly recommended.

Nerve Injuries, Peripheral

Diathermy will relieve pain and hasten repair. Apply large block tin or mesh electrodes to include affected nerve between them. Treat at skin tolerance for thirty to sixty minutes.

Neuralgia

All forms of neuralgia respond readily to diathermic measures. Apply electrodes to include affected area between them, using two large block tin or mesh electrodes. Technic as in Arthritis, pp. 34 to 37. Treat as often and as long as is required to relieve the pain, and at the same time seek the cause and treat it by whatever measures indicated. Focal infections such as are found in the tonsils and around diseased teeth should receive attention. Trigeminal neuralgia will usually require, in addition to diathermy, some opiate to relieve the pain.

Neuralgia, Intercostal

See Intercostal Neuralgia, page 75.

Neuralgia, Ovarian

See Ovarian Neuralgia, page 92.

Neuralgia, Supra-Orbital

See Supra-Orbital Neuralgia, page 99.

Non-Vacuum Electrode

At Left: Use of non-vacuum electrode, with monopolar current, in treatment of facial and glandular conditions. 1/8 to 1/4 in. spark, treatment for 10 to 15 minutes.

At Right: To avoid unpleasant sparking when making contact, connect tube to unipolar outlet of machine, regulate spark, then place your fingers on tube until it is in contact with patient. Fingers are then removed and electrode is moved over area to be treated.

Neuritis

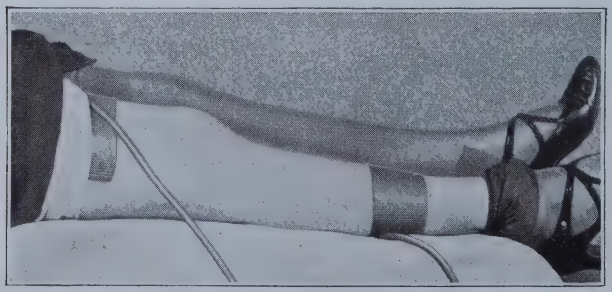
To quote from Grover*, neuritis is an inflammation of a nerve. It is usually confined to the nerve coverings, hence should be called perineuritis. It may affect the connective tissue sheath of the nerve. It may extend from the periphery to the spinal cord or brain. It presents all degrees of severity, from very mild myalgic pains, to very severe when degeneration of the nerve takes place.

Multiple neuritis is characterized by simultaneous inflammation of several nerve trunks, usually on both sides of the body. This form is due to a chronic poisoning from alcohol, arsenic, mercury, lead or malaria. It sometimes follows infectious diseases such as diptheria and typhoid.

Neuritis is always due to pressure either from within or without the nerve sheath. When from within, it is due to infection or poison, and when from without it is due to mechanical pressure from tumors, dislocations and the like or chemical activation.

The treatment *par excellence* in the early stages is diathermy, used twice daily for twenty to thiry minute periods. In the chronic stage static wave current alternated with diathermy will be of service to remove infiltrations and exudates. If the cause is discovered early and removed, diathermy will cure the case before it has had time to become chronic.

The basic cause—infection, poisoning, faulty habits of eating, drinking and living, must of course be found and removed. It is important, too, that the patient be relieved from nerve strain; rest and comfort will do much for the neurotic sufferer.



At Left — Application of electrodes in neuritis—lower limbs.

* Handbook of Electrotherapy, by Burton Baker Grover, M.D.

Brachial Neuritis

Diagnosis—Brachial neuritis.

Treatment—Medical diathermy.

Method—Auto-condensation handle in hand and small plate over painful area.

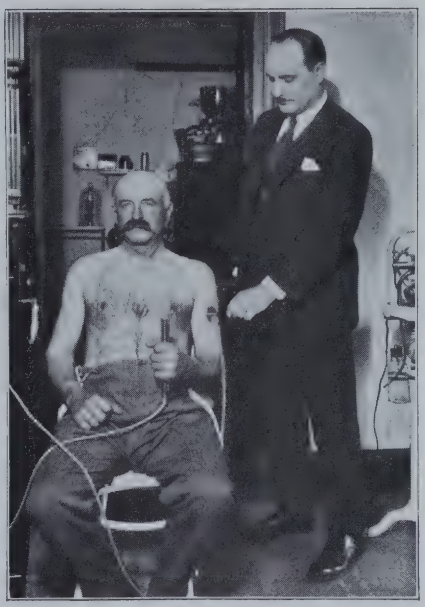
Duration—20 to 30 minutes.

Milliamperes—500 to 1200, according to patient's condition and tolerance.

Indication—Positive diagnosis.

Contra-indications—None.

Illustration at the right shows diathermy treatment of Brachial Neuritis.



Neuritis, Ulnar Nerve

Diagnosis—Neuritis, ulnar nerve.

Treatment—Medical diathermy.

Method—Cuff electrodes on upper arm and wrist.

Milliamperes—500 to 1200, according to patient's condition and tolerance.

Time—20 to 30 minutes.

Indication—All cases neuritis.

Contra-indications—None.

Illustration below shows application of electrodes for treatment of neuritis of the ulnar nerve.

Nosebleed

Nosebleed may be caused by raw spots or scratches within the nasal cavity, by small ulcers or other points of inflammation. In such cases, coagulation of the affected point by a very brief application of the surgical diathermy current is indicated. In nearly every case this will put an end to the nosebleed, and the post-operative condition is very satisfactory. The slough will come away of its own accord after a few days' time, leaving a clean scar.

Treatment

Diagnosis—Nosebleed caused by scratch, etc.

Method—Surgical diathermy.

Indifferent electrode—Auto-condensation handle firmly held in patient's hands.

Active electrode—Waggoner, indirect.

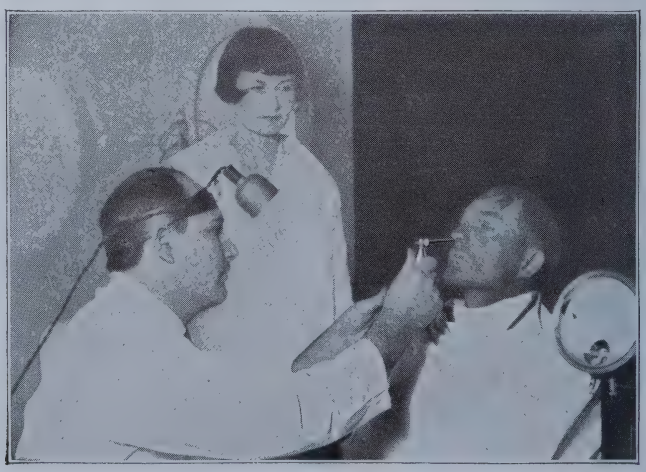
Anesthetic—Local.

Time—Few seconds, until area turns gray-white. Be careful not to coagulate too deeply.

Indications—All raw or bleeding spots in nose, small ulcers, etc.

Technic

After local anesthetic is injected and given time to take effect, Waggoner needle is applied to affected point, care being taken not to insert needle too deeply. Current is then switched on and off momentarily with foot switch until just the right degree of coagulation, and no more is secured.



Diathermy to Nose

At Right:—Treating nasal mucous membrane by indirect method. Patient is seated on the auto-condensation pad which is connected to the central binding-post (monopolar coil) of the Fischer High Frequency machine. Holding a nasal vacuum electrode in contact with the area to be treated, the operator cautiously applies the current, using a foot-switch. The current is then drawn from the patient's body through the electrode to the operator, who acts as a "ground" to the current.

Indications—All inflammations of nasal mucous membrane.

Method—Indirect medical diathermy.

Time—Daily. (10-15 minutes.)

Milliamperes—300-400. Auto-control 4-6.

Below:—Monopolar diathermic treatment of nose. Special nasal electrode. Set for 1/8 in. spark or less, treat for 5 to 8 minutes, each nostril. This method of treatment has been used rather extensively in asthma and hay-fever, acute and chronic coryza, and all so-called "catarrhal" conditions of the nasal mucous membrane.

Onychia

See treatment of felon, page 64. The air-cooled ultra-violet lamp is used in conjunction with diathermy.

Orchitis

See epididymitis, page 64. The treatment is the same.

Osteomyelitis

See article on the treatment of tuberculous osteomyelitis, pp. 108 and 109, for technic. In acute osteomyelitis, drainage must be established as quickly as possible. Diathermy is extremely valuable in the treatment of this condition.

Otitis Media

In acute otitis media, when the ear is red and bulging, diathermy sometimes is preferable to paracentesis. Use either a small block tin electrode with a large indifferent electrode, or a non-vacuum electrode of the type that will fit directly into the ear. Treat for about twenty minutes, with milliamperage at patient's tolerance. Repeat at intervals of six to twenty-four hours, depending on how rapidly the acute inflammation subsides. In chronic catarrhal otitis media, the same treatment is employed, in conjunction with the positive static breeze. Following diathermy treatment, it is well to use the therapeutic lamp about four inches from the ear for twenty-five minutes. This will aid to relieve pain.

Ovarian Neuralgia

Diathermy is indicated for relief of the pain. For technic, see section on Diathermy in Gynecology, pp. 68 to 71.

Ovaritis

The technic is the same as for ovarian neuralgia. See Diathermy in Gynecology, pp. 68 to 71.

Ozena

See Nasal Catarrh, p. 53. The technic is the same. In this condition, the nasal mucosa should also receive daily irradiations from the ultra-violet lamp in addition to the diathermy and general medicinal measures.

Papillomas

See Benign Skin Blemishes, pp. 42 to 45.

Palsy (Paralysis Agitans)

Daily massage with the vacuum surface electrode may be tried. Little benefit is to be expected from any treatment of this condition unless there is an element of hysteria, or the condition is of a transitory nature. Bell's palsy responds very quickly to this treatment. For technic, see Hysteria, page 75. Electrode application is shown on page 87.

Paralysis

See section on Palsy, page 92.

Periostitis

Diathermy is extremely effective in the treatment of this condition. Give daily treatments of from thirty to sixty minutes duration. Treat to skin tolerance. Apply large block tin or mesh electrodes to include affected parts between them.

Pertussis

Diathermy may be tried. The technic is the same as for pneumonia. See pp. 96 and 97.

Pharyngitis

See Laryngitis, p. 83, for technic.

Phlebitis

Use mild applications of diathermy. Care must be used not to over treat or to manipulate the thrombosed veins on account of the danger of producing an embolus. Treat for thirty minutes daily.

Proctitis

Apply mesh-sponge to anus with large block-tin or mesh electrode over abdomen. Elevate the current to the skin tolerance and treat for thirty minutes daily. The perineum should be shaved and soap later applied to prevent sparking. This treatment is quite effective.

Prostatitis

Use same technic as in Proctitis, but treat with bladder distended. After treatment massage the prostate and have the patient evacuate the bladder. This washes out all waste products and cellular debris. Elevate the amperage to the skin tolerance and treat twenty or thirty minutes. It is also possible to treat this condition using the special prostatic electrode, but the above procedure is more comfortable to the patient.

Pruritis, Ani

Use rectal vacuum electrode and spark irritated area for about five minutes using 1/4-inch spark. Treat daily.

Psoriasis

In treating the scalp use the special scalp electrode and 1/4-inch spark. For body use surface vacuum electrode. See page 87 for application of this type of electrode. Treat for from ten to twenty minutes daily.

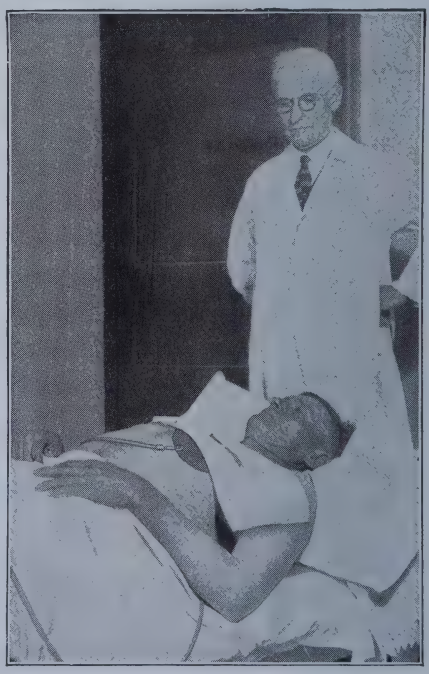
Pleurisy

In this disease, as in pneumonia, diathermy treatment directly *through* the affected area is used. Excellent results have been achieved in the various types of pleurisy, relief of pain and dyspnea being afforded by each treatment. Technic is similar to that used in pneumonia. Two large mesh electrodes, or tin plate electrodes, are so placed as to include the affected area between them. In applying the electrodes, use sufficient warm soap lather to insure perfect contact, and warm the electrodes before applying to the surface of the skin.

Current is turned on gradually and raised to the point of tolerance, remaining at that point from twenty to thirty minutes, then gradually turned off. Milliamperage will be from 1700 to 2000 milliamperes at the maximum, although some cases may require less.

Where there is marked effusion present, diathermy may be employed after proper drainage has been established. It must be borne in mind always that the heat produced within the affected tissues themselves by diathermy, promotes increased metabolism. Therefore, drainage must always be provided when effusions are present, to care for a possible increase in exudate.

Care must also be taken to prevent the electrodes from slipping or becoming detached during the treatment, which would cause sparking and might burn the patient's skin. Do not depend on the weight of the patient to hold the posterior electrode in place. A firm elastic bandage will ensure perfect contact of both electrodes.



Diathermy treatment of Pleurisy.

Pleurisy—Continued

Pleurisy

Electrodes being placed for treatment of right lung area.

Treatment

Diagnosis—Pleurisy.

Symptoms—Pain, accentuated by deep breathing.

Treatment—Medical diathermy.

Method—Plate to back, mesh anteriorly.

Milliamperes—700 to 2000.

Time—20 to 30 minutes.

Indications—All cases. If fluid is present, aspirate or drain.

Pneumonia

Speaking of pneumonia cases treated by diathermy, Harry Eaton Stewart, M.D., reported: "In every single case and almost every single treatment the temporary effect upon the patients was remarkable. Cyanosis disappeared, the expiratory grunt when present was markedly lessened or stopped entirely. Respirations were less labored and the patient received from two to four hours of very marked relief, in many cases obtaining sound sleep . . . It is not too much to assume that in many critical cases this marked relief of symptoms may be the turning point in disease. Under proper technique there is no danger of ill effects from two or even three diathermy treatments per day."

While it is accepted as fact by many physicians that pneumonia runs its course uninfluenced by medicine, results obtained by those using diathermy indicate that during the first stage congestion may be dissipated by this treatment, and the second and third stages can be very favorably influenced by its application.

Technic of treatment is excellently summarized by Burton B. Grover, M.D.*: "In case of one lung involvement, place large electrodes anteriorly and posteriorly. In double pneumonia,

Diathermy treatment of Pneumonia.

* HANDBOOK OF ELECTROTHERAPY. by Burton Baker Grover, M.D.

place the electrodes laterally; in any case, bring the involved tissue between the electrodes. A chair pad may be slipped under the patient as the posterior electrode. Warm the electrodes, cover with soap lather and apply directly to the skin. Begin with low amperage and, in the state of engorgment, gradually raise it to 1700 to 2000 milliamperes (within the toleration of the patient) and continue its application for twenty to thirty minutes and repeat every six hours. In the stage of hepatization a lower milliamperage should be used, reaching 1400 milliamperes at the close of the treatment. Twenty minutes will be sufficient. Repeat every six hours."

The development of the portable diathermy apparatus to a very high degree of efficiency makes it possible for the physician, today, to give accurate and effective diathermy treatments in the home of the patient.

Treatment

Diagnosis—Lobar Pneumonia, second stage.

Modality—Medical Diathermy.

Method—Plates front and back.

Duration—Twenty to thirty minutes.

Milliamperes—600 to 2000 according to patient's condition and tolerance.

Indications—Pneumonia diagnosis.

Contra-indications—Weak heart, extreme prostration, cerebral or abdominal complications.

Pneumonia

Illustration shows the large electrode applied over the chest. A similar electrode is placed under the patient's back.

Rhinitis

Diathermy gives relief of this condition. For technic see page 91. Treat from 5 to 15 minutes, using either vacuum or non-vacuum electrode and only sufficient current to produce a sense of warmth in the inflamed mucous membrane.

Rickets

Diathermy may be employed to hasten reparative processes, i. e., the laying down of normal osseous tissue. The ultra-violet ray is almost a specific in the treatment of this condition and supplants diathermy.

Sacro-Iliac Arthritis

Diathermy treatment is effective. Use large block tin or mesh electrode under hips and a similar electrode on the anterior surface above. See page 111 for application of electrodes. Treat at skin tolerance for thirty minutes or more, daily or twice daily.

Salpingitis

See Diathermy in Gynecology, pp. 68 to 71.

Scars

Painful scars may be treated by diathermy. For application of electrodes, see Adhesions, p. 26.

Sciatica

Diathermy affords great relief in this extremely painful condition. Apply a fairly large block-tin or mesh electrode underneath the hip along the course of the inflamed nerve with a similar sized and shaped electrode on the anterior surface above. Treat at skin tolerance for at least thirty minutes daily or twice daily. If the pain extends the full length of the leg, treat in sections. The custom of placing one electrode against the hip and another on the ankle or sole of the foot is to be condemned as the resistance of the great amount of tissue to be traversed reduces the diathermic effects to a degree where no benefit is derived from the treatment. For application of electrodes see page 111.

Scoliosis, Functional

Daily massage with the vacuum surface electrode may be tried. Little benefit is to be expected from any treatment, however, unless the condition is of a transitory nature. For illustrations and technic of using surface electrodes, see page 87.

Sebaceous Cysts

See Benign Skin Blemishes, pp. 42 to 45.

Seborrhea

The vacuum electrode is of value in this malady. In treating

the scalp, use the special scalp electrode and 1/4 inch spark. For the body, use surface vacuum electrode. Treat from 10 to 20 minutes daily. For application, see page 87.

Septicemia

For diathermy treatment, place electrodes at points so that the high frequency current will traverse the area of infection. Treat almost constantly until the process is localized. Milliamperage, skin tolerance. For puerperal septicemia, see section on Diathermy in Gynecology, pp. 68 to 71.

Sinus Infection

Drainage is the first essential. This may be established surgically, or by the use of positive galvanism, using a probe wound with a little cotton and dipped in 1-10,000 solution of adrenalin hydrochloride. Insert the probe, attach to the positive pole of the galvanic current and connect the negative to a large indifferent electrode on the cheek. About three milliamperes of current is used, for five minutes. The current is then turned off slowly and the probe removed. The pus and mucus will come out on suction then, as a rule, or even by long-continued blowing of the nose. This may be followed by diathermy, with one electrode on the forehead and the other, which must be a heavy wire or rod wrapped in cotton and saturated with boric acid solution, in the nasal cavity. Patient's tolerance.

Spider Nevus

See Benign Skin Blemishes, pp. 42 to 45.

Sprains

Diathermy is quite useful in the treatment of sprains, it relieves the pain, hastens absorption, accelerates repair. For application of electrodes, see section on the part to be treated: wrist, ankle, elbow, etc.

Suppuration

Same technic as for all infectious processes.

Supra-Orbital Neuralgia

Diathermy is often very useful in this condition. Apply small electrodes, or use the fingers for treating at the points of exit of the sensory nerves. Use a mild current, and treat for twenty minutes daily.

Telangiectases

See Benign Skin Blemishes, pp. 42 to 45.

Sycosis

See Seborrhoea, p. 98.

Diathermy to Shoulder

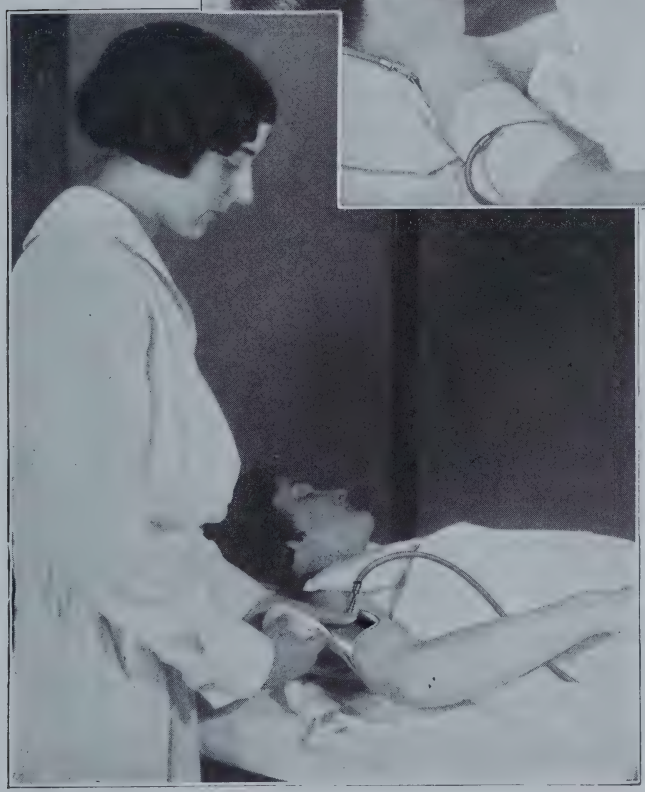
At Left:—4x6 inch block tin electrode is placed under shoulder, large mesh sponge electrode above, held in place by sand bag.

Diathermy to Shoulder

At Right:—Showing the same treatment with electrodes and sand bags in place. 1000 to 1500 milliamperes (patient's tolerance) for 20 minutes.

Diathermy to Shoulder

At Right: — Triple electrode treatment; 4x5 in. block tin under shoulder, 4x5 in. mesh above shoulder, half cuff on upper arm.



Diathermy to Shoulder

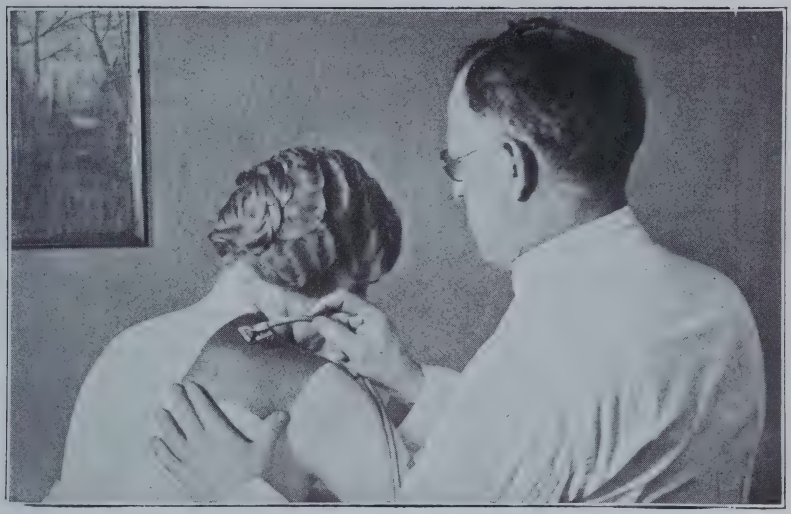
At Left:—Same treatment, showing application of cuff to arm. Attach one pole of machine to this cuff, other pole to both the shoulder electrodes. 1000 to 1500 milliamperes (patient's tolerance) for 20 to 30 minutes.

Diathermy to Shoulder

At Left: — Showing mesh electrode applied over shoulder, mesh cuff electrode about arm. A towel is placed under arm to absorb perspiration and avoid concentration of heat at that point.

Diathermy to Shoulder

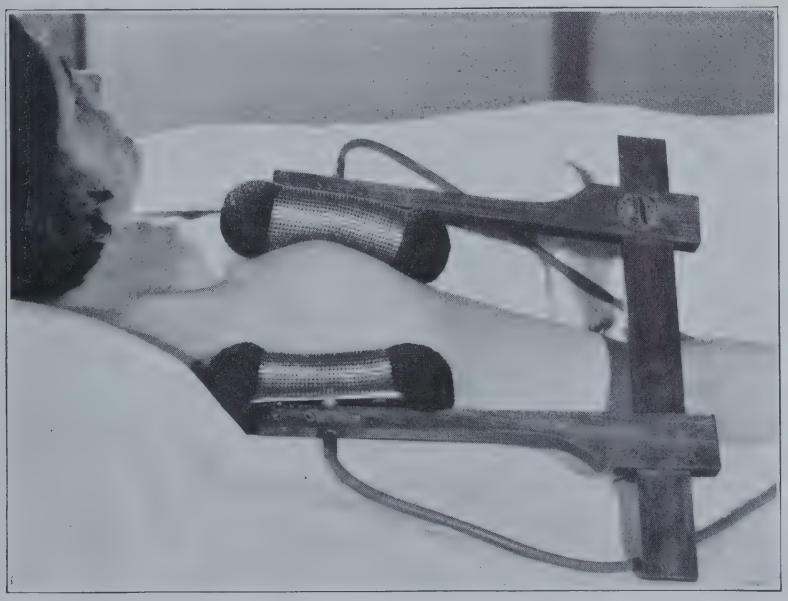
At Right:—Application completed, with sand bag over shoulder electrode and elastic bandage around arm electrode. 800 to 1200 milliamperes, patient's tolerance. 20 minutes.



Diathermy to Shoulder

Above: Showing application of mesh electrode—other electrode is a cuff on upper arm. 1000 to 1500 milliamperes for 20 minutes.

Below: Diathermy clamp application of double disc electrodes to shoulder for concentrated heat treatment. 300 to 400 milliamperes, patient's tolerance, for 20 minutes.



Diathermy for Tic Douloureux

Above:—Block tin indifferent electrode, shaped to under side of face. Active electrode is disc, held by operator. Toleration milliamperage for 15 minutes.

Diathermy Through Ears

At Right: Treating two patients at once, with the same machine, using special Linn Electrodes. Milliamperage, patient's tolerance (about 400 milliamperes) for 20 minutes. Stop treatment if vertigo appears.

Tonsil Cases

Physiotherapists who use the electrical modalities in tonsil cases claim a degree of success equal to that achieved in the cutting operation, together with greater ease of operation and less discomfort to the patient. The diathermy operation is bloodless, the diseased parts are sterilized because the current used is germicidal, and singing and speaking voices are not impaired.

The edema which follows the electrical operation may be held to a minimum by care in operation. Proper technic will ensure a condition after the operation vastly preferable to that following tonsillectomy by the knife method. The patient may go about his business the next day, in nearly every case, and the after-soreness, which is slight, will disappear within a very few days.

Two different technics may be employed to advantage in the destruction of tonsil tissue, fulguration and coagulation. In addition, medical diathermy, the application of heat to the affected tonsil by means of the high frequency current, may be used to advantage in certain types of tonsil cases, notably in hard tonsils and in enlarged tonsils.

Local anesthesia is used by most surgeons in the tonsil operation by diathermy—ether would be dangerous because of the possibility of an explosion. In some cases, no anesthetic is required. The local anesthetic may be swabbed over the surface of the tonsil or injected, depending on the nature of the case and the preference of the operator.

A number of special electrodes have been devised for use in tonsil operations, and one of these, suited to the case in hand, should be employed in the diathermic operation, since both operator and patient will experience better satisfaction through the use of correct instruments.

It is possible, in using diathermy for tonsil operations, to perform part of the operation and then wait until the resulting slough has come off before operating upon the remainder of the tonsil. This method has two distinct advantages. First, it makes the operation a comparatively easy one for both surgeon and patient, since each application of diathermy will take but a few minutes altogether. Second, it frequently is found, after partial operation, that the remaining tonsil tissue will return to normal under the germicidal influence of the current used in the operation.

Tonsil Treatment

FULGURATION. The hollow glass electrode is used, affording regulation of the intensity and direction of the sparks. The tonsil is prepared for operation by anesthetizing according to the surgeon's preference. The electrode is then applied directly to the tonsil, with a large indifferent electrode in the dorsal region, or with the patient holding the auto-condensation handle. A foot switch is used, and current turned on and off as the surface of the tonsil is covered. The operation may be repeated at intervals of a few days until complete recovery results. For the after soreness, an epsom salt gargle is recommended by some surgeons.

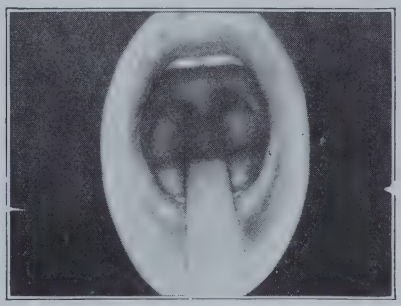
ELECTRO-COAGULATION.

The needle electrode is used, with large indifferent electrode in dorsal region or auto-condensation handle in patient's hands. After anesthetizing the tonsil, the needle is inserted into the surface of the tonsil about one-eighth of an inch and the current turned on by a foot switch. Leave the current on only until the tissue around the electrode turns a grayish white — coagulation only is desired, not an actual charring of the tissues. Repeat this until the desired area has been covered. The resulting slough will come away within a week or ten days. Epsom salt gargle may be used for after-soreness, and epsom salt compresses if there is marked edema.

Electro-coagulation of tonsils.

Electro-Coagulation Treatment of Tonsils

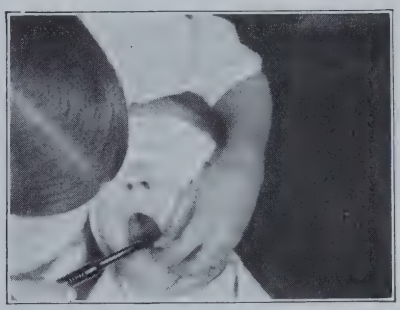
Five steps in the electro - coagulation treatment of tonsils.



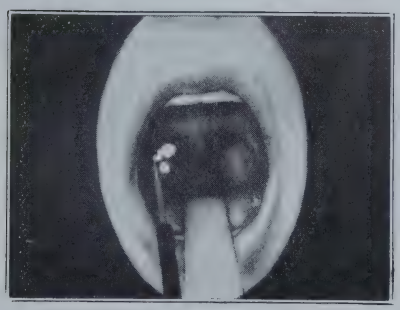
1. Showing diseased tonsils exposed for treatment.

Photos of a tonsil coagulation performed by R. F. Elmer, M. D.

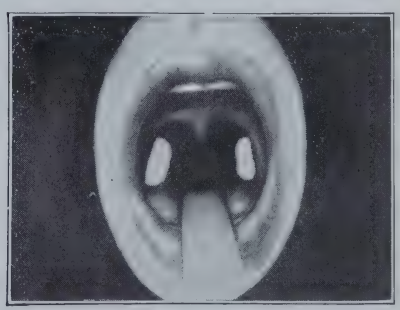
2. Injecting the anesthetic into the tonsil.



3. Inserting the electrode into the tonsil.



4. Showing one tonsil partly coagulated.



5. Showing both tonsils completely coagulated.

Tuberculous Osteomyelitis

This malady, formerly considered as a case for surgical intervention, plaster casts and weights, has yielded to physiotherapeutic treatment in a gratifying percentage of cases. Naturally, after diagnosis has been confirmed, the usual steps are taken to regulate diet, elimination and contributory causes such as tuberculous infections elsewhere in the body. The diathermy treatment is perhaps best illustrated by quoting a typical case, reported by W. B. Chapman, M. D., of Carthage, Mo.:

Patient aged 12 years. Left knee swollen and painful since two years of age. At times quiescent, but never reduced in size to normal, and on the least exposure to cold, or if over-exercised, the knee would swell, become red and extremely painful and child would be confined to bed for weeks. Fig. 2 shows the relative size of the two knees at a time when the condition was at its best. A diagnosis of tuberculosis of the bone was made by X-ray, and diathermy treatment prescribed. Plate electrodes cut from block tin and shaped to the contour of the leg were applied on each side of the swollen portion of the leg and held in place by an elastic bandage as shown in Fig. 4. 1500 milliamperes of current was passed through the leg for thirty minutes each day for six treatments. A red spot appeared after the third diathermy treatment which became necrotic in the center (Fig. 1). This was lanced, a quantity of pus evacuated and sterile dressings applied until the sinus healed. Fig. 3 shows the leg well and the same size as the other leg for the first time in ten years. The above procedure is regularly employed at this clinic in the treatment of bone tuberculosis.

Fig. 1. Necrotic Spot.

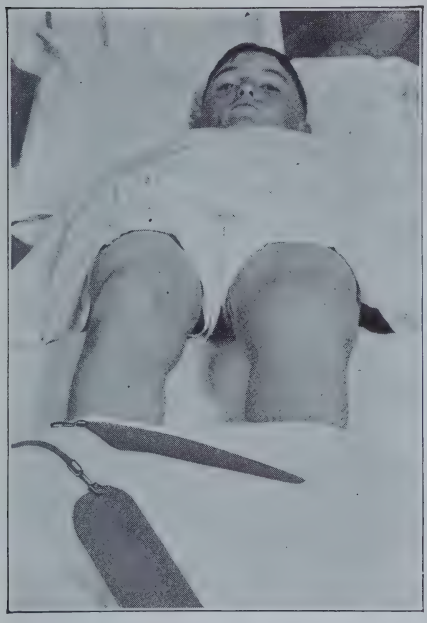


Fig. 2 (above) shows swollen knee at beginning of treatment. Fig. 3 (right), same knee, well and normal in size, after diathermy treatment.

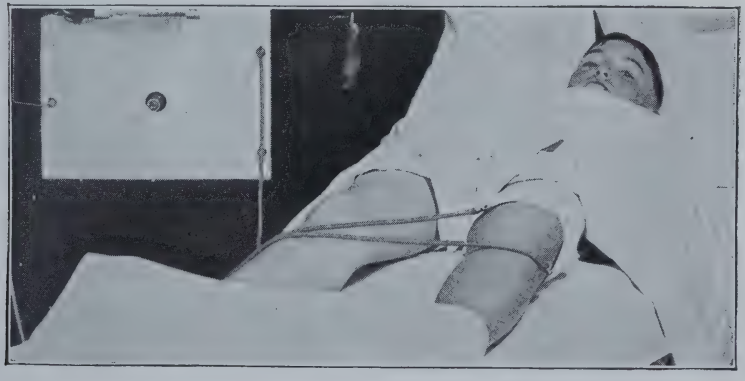


Fig. 4. Application of electrodes in Bone T. B.

Treatment

Diagnosis—Bone tuberculosis.
Method—Medical diathermy.
Electrodes—Large tin plates applied laterally and held in place by elastic bandages.
Milliamperes—1200—1500.
Time—30 minutes daily.
Indications—All cases of bone T. B.
Contra-indications—None.

Tuberculosis of the Hip

(Hip Joint Disease)

As in all cases of bone and joint tuberculosis, the symptoms of this disease are aggravated by exposure to cold and by over-exertion. Ordinarily the hip is somewhat swollen, and painful, sometimes to the point of compelling complete immobility for periods of time.

Hip joint disease may nearly always be taken as an indication that tuberculous foci of infection exist elsewhere in the system. Some physicians hold that tuberculosis never is present anywhere in the body without a concurrent—or previous—infection of the lungs. Naturally, before a cure of the hip lesion can be effected, these other focal sources of infection must be located and eliminated.

Diet, fresh air and sunlight—all the usual physiotherapeutic measures—must be combined with local treatment. If there is pus present, as is quite likely to be the case, drainage may or may not be instituted. Patience is required in the treatment of this condition, both on the part of the physician and the patient.

Along with regular diathermy treatment, quartz lamp radiation of the entire body, the artificial sunlight treatment, is of benefit in this disease, as in all tuberculous affections.

These diathermic treatments help the tuberculous lesion by direct action. There is an attenuation of the bacilli produced by the excessive temperature, furthermore, the heat automatically produces a vasodilation of the arterioles and venules with a great influx of freshly oxygenated blood to the part, also a concentration of the bactericidal enzymes of the blood with a raising of the opsonic index. The vascular disturbance attracts leucocytes; phagocytic activity is increased and the infection stamped out. The heat and the heathy hyperemia favors repair. Fibroblasts are stimulated, disintegration products are absorbed, the calcium content of the tissues is raised and healing proceeds.

Tuberculosis of the Hip—Continued

Block tin electrode 4x7 in. is applied posteriorly as shown. Anteriorly, use either block tin (shaped to body surface) or mesh electrode, same size, held in place by sand bag.

Treatment

Diagnosis—Hip joint disease.

Symptoms—Shortening and rotation of leg.

Confirmation—X-ray findings.

Treatment—Diathermy and actino-therapy.

Electrodes—Block tin and mesh.

Milliamperes—1500 to 2200—skin tolerance.

Time—20 to 30 minutes daily.

Tuberculosis, Pulmonary

Physiotherapy treatment of Pulmonary Tuberculosis, particularly in the early stages, has met with gratifying success. While there is no such thing, of course, as a "specific" for tuberculosis, many physicians report excellent results from the combination of rest, proper food, fresh air and sunlight, removal of contributory causes such as infected tonsils, regulation of elimination, and diathermy treatments to the affected pulmonary areas.

In diathermy treatment of this disease, care must be taken in locating the lesion or lesions. X-ray is recommended as the only sure method, since percussion has been found undependable in many cases. It is essential, of course, that diathermy treatment be accurately prescribed, both as to dosage and as to area treated.

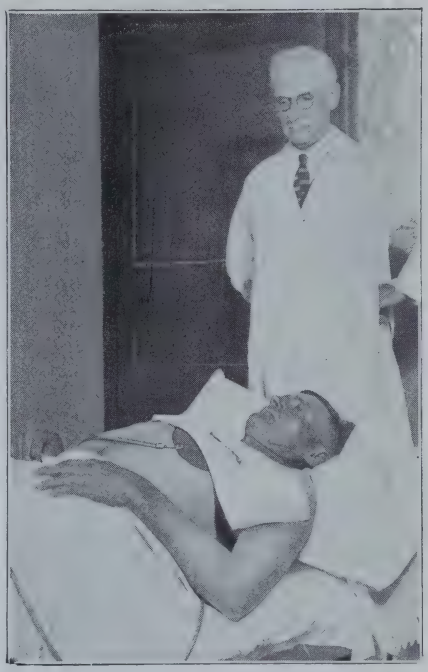
Along with the other therapeutic requirements in pulmonary tuberculosis it is very important that the patient be kept cheerful and hopeful. Therefore, it is worth while bearing in mind that one of the chief values of physiotherapeutic treatment is that it presents to the untrained eye external evidence of something being done for the patient. The encouragement this affords is a potent factor in hastening recovery.

Diathermy, as used in pulmonary tuberculosis, is a sedative rather than a stimulative treatment. Care must be taken in administering the current, since the result desired is an acceleration of the natural action of the bodily forces which are fighting the disease, rather than any destructive effect on the tubercle bacilli themselves. In advanced cases, particularly, extreme caution must be exercised to the end that no excessive reaction be brought about in the affected area.

For the first few treatments, in all cases, it is well to be guided by the patient's statements as to how he feels. "Just warm him up a little bit," says Miles J. Breuer, M. D.; "then, after you work along a while, you get an idea as to what your patient can stand." If possible, it is well to get the patient practically free from temperature by rest and diet, before instituting diathermy treatments.

Large block tin or mesh electrodes are used, one on the chest and one on the dorsal region, so arranged that the area to be treated is between them. These electrodes are held in place by bandages or sand bags, and care must be taken to soap the skin thoroughly over the portion to be covered by the electrode. Especially in treatments lasting for some length of time, the patient must be watched, since a restless movement might result in displacing one or both of the electrodes.

Symptoms increase, as a rule, during the first few days of the treatment; more cough and higher temperature are to be expected. After ten days to two weeks treatment, however, improvement should begin to appear.



Pulmonary Tuberculosis
Showing application of chest electrode for lesion in apex of left lung.

Treatment

Diagnosis—Pulmonary Tuberculosis.

Modality—Diathermy current to affected area.

Method—Plates to front and back.

Milliamperes—From 500 to 1000 at the start; later, up to 2500 according to patient's tolerance and condition.

Duration—30 minutes average.

Indications—Positive diagnosis.

Contra-indications—Excessive temperature, prostration, weak heart, hemorrhage.

Tonsillitis

See electro-surgical removal of tonsils, pp. 105 to 107.

Torticollis, Acute

Diathermy is very useful in acute torticollis. Alternate deep diathermic applications with surface massage using the vacuum electrode.

Tuberculous Glands

Diathermy is of the same value in treatment of tuberculous glands as in all other infections. If the glands are actively inflamed, they may be broken down by diathermy, with the formation of pus, which should be evacuated. Apply electrode slightly larger than the inflamed gland, with very large inactive electrode on opposite side of body. Treat as nearly constantly as possible until the affected tissue dissolves.

Turbinates, Hypertrophied

Anesthetize the mucous membrane with from four to ten per cent cocaine solution, and using a pointed electrode, reduce the turbinate by electro-surgical coagulation. For technic, see surgical diathermy.

Ulcer, Duodenal

See Duodenal Ulcer, p. 56.

Urethritis

For female, see section on Diathermy in Gynecology. In treating the male, see paragraph on Gonorrhœa.

Urticaria

Give general body massage with surface electrode. Treat for fifteen or twenty minutes with 3/8 inch spark.

Vaginismus

See Diathermy in Gynecology, pp. 68 to 71.

Vaginitis

See Diathermy in Gynecology, pp. 68 to 71.

Varicose Ulcers

Diathermy may be employed for relief of the pain, but elevation and drainage of the engorged veins is essential.

Varicose Veins

See Varicose Ulcers, above.

Vesiculitis, Seminal

Same treatment as for Prostatitis, page 93.

Warts

See Benign Skin Blemishes, pp. 42 to 45.

Whooping Cough

Same treatment as in Pneumonia, daily until cough is abated.

Diathermy to Wrist

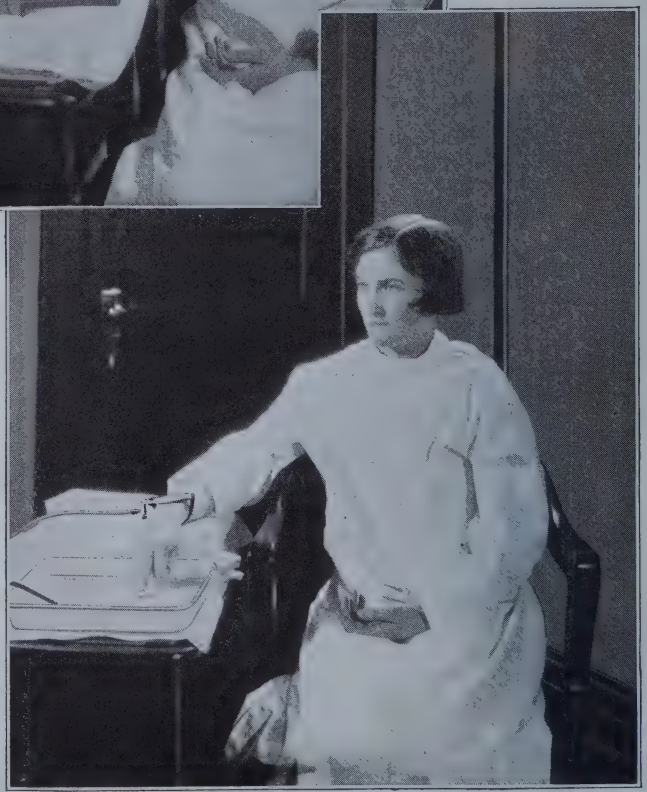
At Right: — Mesh cuff electrode to wrist, hand immersed in basin of water containing other electrode. Heat is thus concentrated at wrist joint. 500 to 700 milliamperes for 20 minutes.

Diathermy to Wrist

At Left: — Showing application of two sponge mesh electrodes one on either side of wrist, held in place by elastic bandage. Sponges are moistened and soaped lightly before applying. 600 milliamperes for 20 minutes.

Diathermy to Wrist

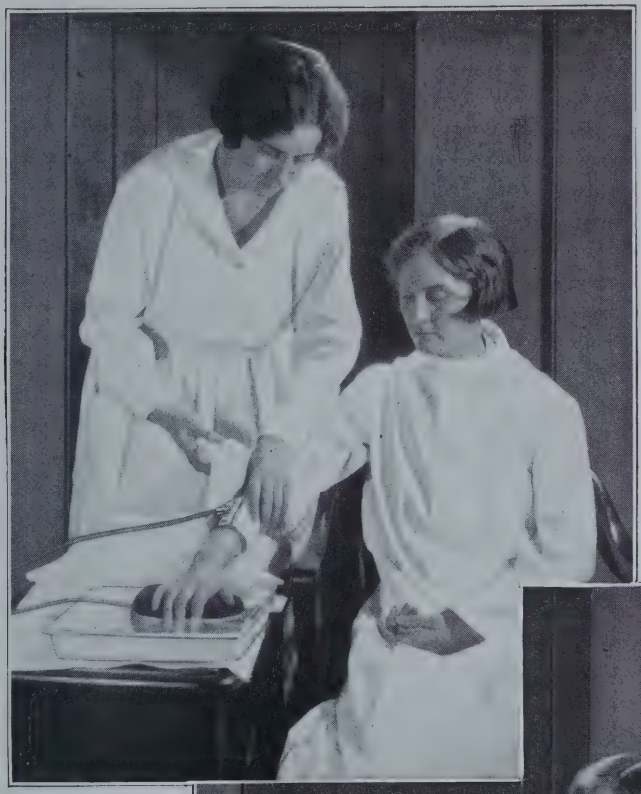
At Left: — A simple method of treating the wrist, using 3 inch cuff held by elastic bandage midway between wrist and elbow, auto-condensation handle in hand. 300 to 400 milliamperes for 20 minutes.



Diathermy to Finger

At Right:—Electrode on wrist, other in basin of water in which finger is immersed. 200 milliamperes for 20 minutes. Patient must be cautioned against lowering other fingers or hand into water or touching pan as a spark will be produced that is unpleasant, and always startles an inexperienced patient. The older patients learn to avoid this.

(*Chapman Clinic*)



Diathermy to Wrist

At Left:—Mesh cuff electrode above wrist, other pole to small metal electrode in basin of water. Fingers are immersed to bring the heat at the desired point. 500 to 700 milliamperes for 20 minutes.

Diathermy to Fingers

At Right:—Mesh cuff electrode around wrist, hand resting on sponge in basin of water in which other electrode is immersed. Fingers are inserted in water to desired depth, to bring heat to affected joints. 500 milliamperes for 20 minutes.

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